BERKELEY MARINA DEVELOPMENT PLAN

LIVINGSTON AND BLAYNEY, CITY AND REGIONAL PLANNERS
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DEVELOPMENT PLAN

Prepared for the City of Berkeley by

LIVINGSTON AND BLAYNEY, City and Regional Planners
JOHN A. BLUME AND ASSOCIATES, Engineers
JOHN CARL WARNECKE AND ASSOCIATES, Architects

San Francisco September 15, 1960 75pp

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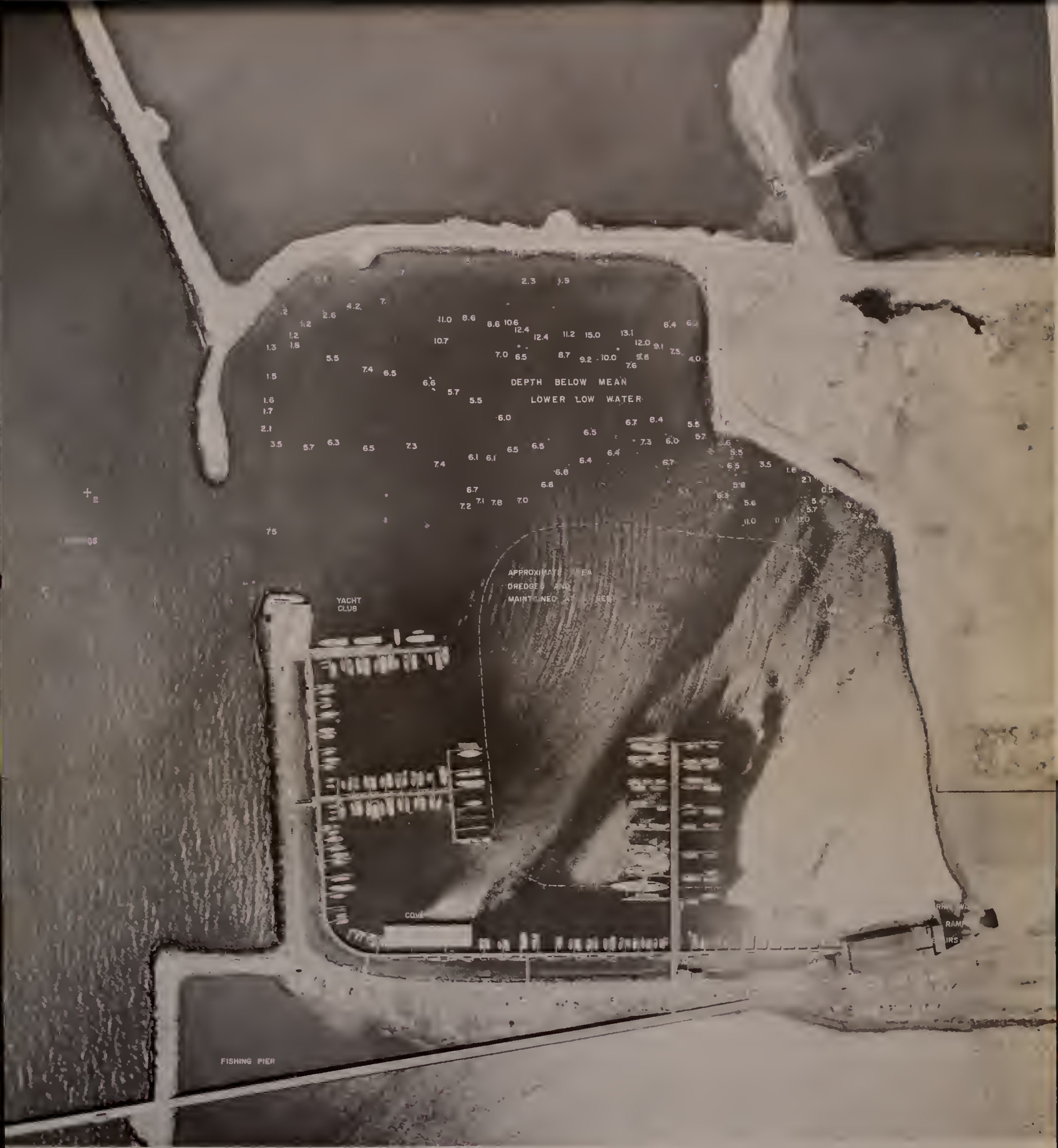


BERKELEY HARBOR EXISTING CONDITIONS

SUMMARY

The municipally owned and operated Berkeley Harbor, built in 1936, now has berths for 204 boats over 16 feet. A long waiting list for berths and the high per-unit cost of operating a small harbor have led to a desire to expand and rehabilitate it, in order to make it self-supporting and to increase its recreational value to both boaters and non-boaters. A construction loan is to be sought from the State Division of Small Craft Harbors for this purpose.

The Berkeley Marina Development Plan is designed to serve as the basis for decisions on construction projects. This report also is intended to demonstrate the economic feasibility of proposed initial improvements.

Market Study

A random sample of boat owners obtained from State registration files was interviewed to determine berthing preferences. The results show that at least 577 berths and probably 725 berths could be rented today at the Berkeley Marina.

Development Plan

The plan provides 403 new berths. In accord with the preferences of boaters, all floating construction and single slips are proposed. A new dike and timber breakwater extending west and north from the harbor entrance will eliminate rough water inside the basin and will ease navigation, particularly for sailboats. The plan also provides for launching ramps and hoists, dry storage sheds, boat repair facilities with a crane and marine ways; an administration building, public restrooms, a bait and tackle shop, a chandlery, a boat sales establishment, a cafe, a snack bar, several large restaurants with banquet facilities, motels, service stations and fuel docks, an expanded Berkeley Yacht Club, a University Yacht Club building, and parking areas, pedestrian ways and landscaped areas.

Feasibility

Portions of the plan recommended to be financed by the $1, 800, 000 State loan include harbor dredging, the breakwater, the berths, certain utilities, parking lots, roads, walks and landscaped areas, the administration building, the public restrooms, the bait and tackle shop, the chandlery, and the cafe. Income from ground leases for boat sales, a 300 seat restaurant with meeting rooms and 120 motel units was included in computing revenues. The conservatively estimated 1.12 : 1.0 ratio of revenue to cost over the 20 year period of the loan meets State requirements.

BACKGROUND

Purpose

The Berkeley Marina Development Plan consists of a design for expansion and improvement of the harbor together with market studies substantiating the demand for additional berths, cost estimates, engineering details, and an analysis of the economic feasibility of the proposals. These studies are intended to enable the City to make an early decision on a precise improvement program and to satisfy the requirements of the State Division of Small Craft Harbors which is authorized to make long-term harbor construction loans to public agencies at a favorable interest rate.

The objectives of the harbor improvement program are:

- To serve the growing number of small boat enthusiasts. Market studies indicate a current demand for at least 373 additional berths at the Berkeley Harbor, and probably in excess of 700 additional berths.

- To place the harbor operation on a sound financial basis. In recent years the harbor has not been self-supporting. Expansion is expected to permit more effective use of personnel and to attract revenue-producing concessions.

- To offer a variety of recreation and entertainment opportunities, and to make the harbor a source of pride to all the citizens of Berkeley.

Present Development

The Berkeley Harbor, owned and operated by the City of Berkeley, is at the foot of University Avenue just off the Eastshore Freeway. It is bordered on the east by land owned by the Santa Fe Railway and the Pacific Guano Company. On the north, south and west are tidelands granted to the City by the California Legislature. Convenient automobile access plus proximity to desirable open water for sailing and to good fishing areas have been major contributors to the harbor's popularity. However, strong westerly summer winds make the Berkeley waterfront hazardous for small boats, and the present harbor entrance is difficult for sailboats without auxiliary engines.

The harbor was constructed in 1936 by the City of Berkeley with federal funds under the W.P.A. program. Additions have been made, including large berths for Navy use installed during World War II, but the harbor never has been completed. The harbor accommodates 204 boats over 16 feet long, and about 80 boats under 16 feet. Included are 42 commercial and party fishing boats. A trailer launching ramp is used by about 50 boat owners each weekend.

Concessions operating on leases from the City are a boat brokerage establishment, a repair shop, a marine service station, a bait and tackle shop, a small cafe, a fish cannery, and a dry storage shed.

The City provides administrative offices, fire protection equipment, lockers, restrooms, a boat lift, and navigation aids. A clubhouse is leased to the Berkeley Yacht Club by the City.

Statistics show that the harbor is intensively used; a current waiting list for berths includes 176 names. More than 200,000 persons visit the harbor area each year. About half are attracted by the adjoining fishing pier which extends 2,000 feet into the Bay. A summer holiday attracts up to 2,100 cars to the area. As many as 800 cars have crowded into the parking lots.

Other Plans

At the same time as the Berkeley Marina Development Plan was being prepared the Consultants were working on a long-range plan for development of the entire Berkeley waterfront embracing 2,100 acres of tidelands extending three-quarters of a mile west of the harbor to the bulkhead line (limit of solid fill). Although the land use pattern for the future fill area has not been determined, studies and preliminary plans demonstrate that there will be no conflict with the Marina Development Plan. The probable creation of a large entry basin west of the present harbor eventually will create more calm water for use of small boats. The waterfront development studies will serve as the basis for an amendment to the Waterfront Section of the Berkeley Master Plan adopted in 1955. There is no precise zoning on the waterfront at present.

Sketch plans for harbor development have been prepared by the Berkeley Recreation Department and City Planning Department and the Berkeley Harbor Improvement Association. All of these proposals were considered during the preparation of the development plan.

THE MARKET FOR BERTHS AT THE BERKELEY MARINA

Rising income levels and availability of more leisure time have led Americans to spend an increasing proportion of their incomes on recreation. Boating has been attracting a major proportion of the increase.

In the United States, the number of recreational boats in use increased from 4.3 million in 1952 to 7.3 million in 1958. Cheaper methods of construction have brought the small boat within the financial means of a great many American families. New man-made lakes and new launching facilities at existing shorelines have made them increasingly attractive; and the contagion of their popularity has reached epidemic proportions in some areas. Costs are still so high, however, that the vast majority of the three million boats added to the stock during the last six years are small enough to be stored on a trailer in the family's two-car garage, and hence they do not require berths.

It may be that for many of its enthusiasts boating is an ephemeral fad soon to be abandoned in favor of some other, but most observers of the boating market, including the traditionally conservative investment banking houses, anticipate a continued rise in boat ownership and consequently a continued rise in the demand for small-craft harbors. Although most of the needed facilities will continue to be the types required for portable boats, there is nonetheless an expanding demand for spaces at marinas where nonportable boats may be stored and cared for.

The boating boom is still so new that very little is known about it. The characteristics of boat owners are only now beginning to be systematically studied, and information on the present stock of boats is just becoming available. There are, as yet, no data on regional trends in sales. No one knows for certain even how many boats there are in any given area, and no one knows what proportion of existing boats fall within any given length class and thus what proportion is portable or berthable.

In years past, California's boat census has been derived from estimates made by the 58 county assessors. These have been very rough approximations, and the sizes of boats have never been reported. Beginning in mid-1960, however, the mandatory State registration of undocumented boats (boats not registered by the federal government) is making fairly reliable information available for the first time.

It is these data that furnish the basis for this market analysis for the Berkeley Marina, the first to use this new source of information. Although all boats have not been registered and although there are some inaccuracies in the reported information, the figures offer a more reliable basis for appraising the market for boating facilities than has been available for earlier marina studies.

Objective of the Study

The contemplated expansion of facilities at the Berkeley Harbor is to take place within the area now enclosed by the harbor dike. Although the City may wish to expand the marina in the future, this study was limited to the presently available space because of the relatively great capital outlay required to expand beyond the diked area.

The Berkeley Marina Development Plan contained in this report provides berths for 605 boats. The market studies were designed to determine whether there is a demand for 401 new berths in addition to the 204 berths now available at the harbor. No attempt was made to determine the maximum number of berths that could be rented.

Two estimates of demand were constructed: the first indicates the minimum level that exists today; the second indicates the probable level of demand that will exist when the expansion is completed. The probable estimate is based on those factors that can be reduced to numbers, and it identifies those additional contributors to demand that cannot be assigned numerical values.

In a period of rising incomes and increasing boating popularity, the demand for berths at Berkeley will not decline and it is likely to rise. If the demand merely remains constant and if there is now a latent demand for as many berths as the City plans to construct, then in the future no berths will be vacant. Forecasting future numbers of boats is extremely difficult, if not impossible, because there exists such scanty information about past trends and present patterns of ownership. Fortunately, for Berkeley's present purposes, prediction is not necessary. Since no boat ownership forecast was made, population and income projections originally included in the market studies program were eliminated. Current population and income data are contained in Appendixes 1 and 2.

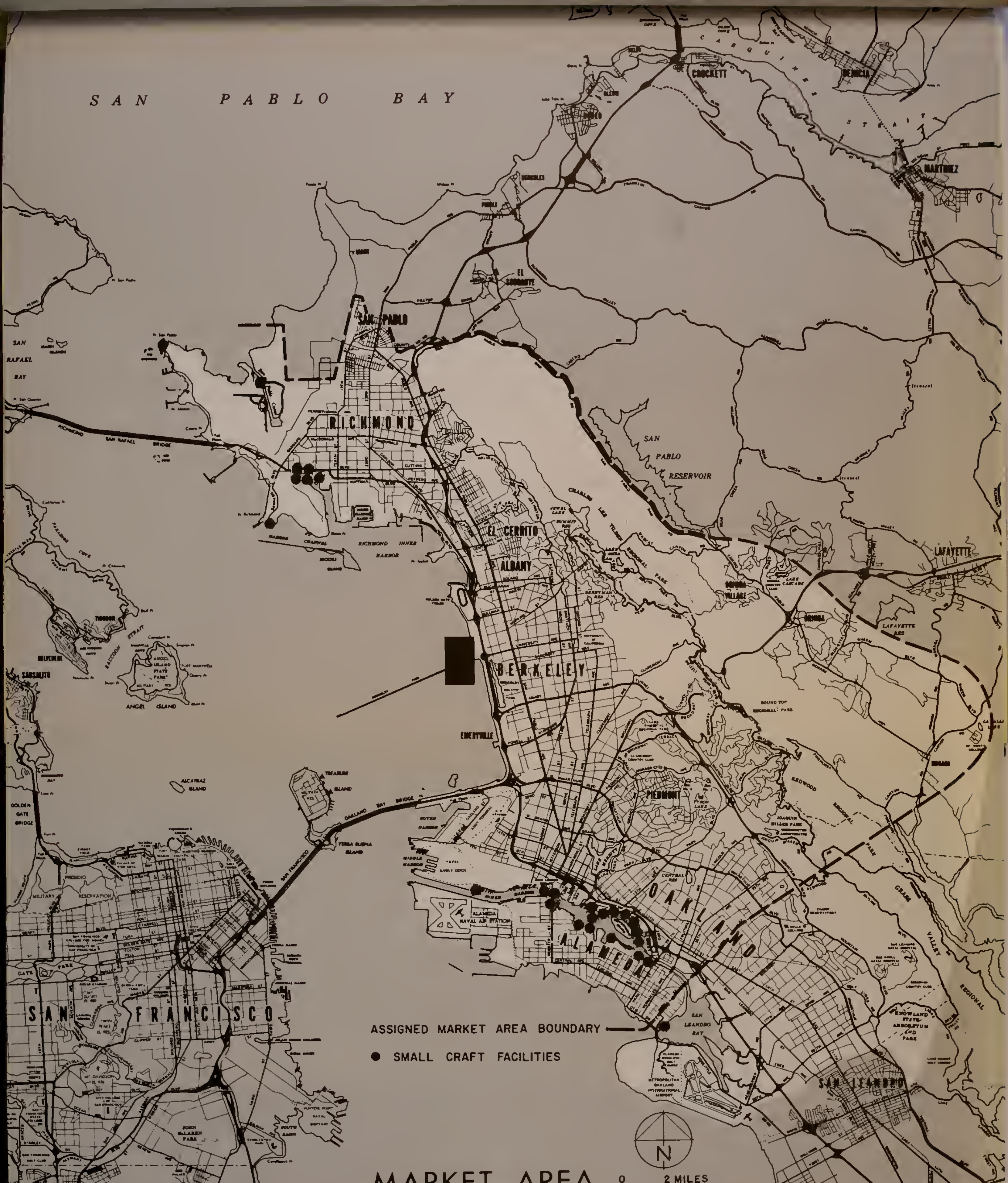
The only factor that would be likely to cause a decline in the Berkeley market is a surplus of new berths in other East Bay harbors. The volume of future construction is not subject to forecasting. A great many harbor projects are being discussed, but few are yet financed. Not even the marina investors themselves know how many new berths they will construct in the next five years or even in the next two years. For Berkeley's present purposes, however, this does not really matter. To be assured of the financial feasibility of the proposed harbor improvement program, the City need only be certain that the rate of increase of berthable boats will not lag significantly behind the rate of increase of berths. Of course, there is no absolute assurance that boat sales will not lag. Marina developers are making their expansion plans with the same handicaps of inadequate information about boating ownership and about user habits; and it is quite possible that some marinas will over-expand. In the foreseeable future, however, it seems reasonable to assume that the total deficiency of berths in the market area will not be eliminated. The increase in the boat census can be expected to keep pace with the increase of berthing places.

The Market Area

The Division of Small Craft Harbors has designated sections of the East Bay as market areas for the San Leandro, Berkeley, and Martinez harbors. These areas approximate the territories lying within 10-mile radii of the existing or proposed harbors at these three cities. Berkeley's assigned market area extends along the East Bay plain from San Pablo on the north to High Street in Oakland on the south, and from the Bay shore on the west to Orinda and Moraga on the east.

It is, of course, virtually impossible to delineate a firm area within which even the "primary market" for berthing and launching facilities lies. Boating, like hiking and camping, is a resource-based recreational activity. It requires that boaters travel from their homes to those waters whose attributes are particularly attractive to them. Those who tow their boats behind their cars frequently are willing to travel several hundred miles to get to the waters that they like. The man who owns a trailer-borne boat need not, and usually does not, choose the body of water nearest to his home, simply because of its proximity.

Those who keep their boats in the water have less choice of boating locations. Because travel speeds of automobiles are many times faster than travel speeds of boats, the owners of berthed vessels seem to prefer berthing sites close to the waters of their preference rather than close to their homes; and they seem to be willing to drive considerable distances to get there. At least 15 per cent of boats in the Berkeley Harbor, for example, are owned by people who live over 10 miles away and have marina facilities within 5 miles of their homes. A common explanation offered by these owners is that the Berkeley Harbor is "close to the good fishing areas in the Bay" and that it is "easy to get to by car". A boat trip from a harbor near


SAN PABLO BAY
CROCKETT
BENICIA
CARQUINES STRAIT
MARTINEZ
RODEO
PINOLE
HERCULES
EL SOBRANTE
SAN PABLO
RICHMOND
SAN RAFAEL BAY
RICHMOND SAN RAFAEL BRIDGE
RICHMOND INNER HARBOR
SAN PABLO RESERVOIR
CHARLES LEE TILDEN REGIONAL PARK
EL CERRITO
ALBANY
BERKELEY
EMERYVILLE
ORINDA
ORINDA VILLAGE
LAFAYETTE
LAFAYETTE RES
MORAGA
REDWOOD REGIONAL PARK
GRASS VALLEY REGIONAL PARK
PIEDMONT
OAKLAND
ALAMEDA
ALAMEDA NAVAL AIR STATION
SAN LEANDRO BAY
SAN LEANDRO
METROPOLITAN OAKLAND INTERNATIONAL AIRPORT
TIBURON
BELVEDERE
SAUSALITO
RACCOON STRAIT
ANGEL ISLAND
ALCATRAZ ISLAND
TREASURE ISLAND
YERBA BUENA ISLAND
SAN FRANCISCO OAKLAND BAY BRIDGE
GOLDEN GATE BRIDGE
PRESIDIO
MILITARY RESERVATION
GOLDEN GATE PARK
SAN FRANCISCO
ASSIGNED MARKET AREA BOUNDARY
● SMALL CRAFT FACILITIES
N
0 2 MILES

MARKET AREA

the owners' homes to the fishing grounds near the Berkeley Harbor would be too slow for many people.

Other boat owners who live in Berkeley prefer not to berth their boats at the Berkeley Harbor, either because they enjoy boating in other locales more or because they dislike the wind and wave conditions at Berkeley. These people choose to drive considerable distances to other marinas in the East Bay, San Francisco, Marin County, the Delta area, and elsewhere. Appendix 3 shows the locations of boats owned by residents of Alameda and Contra Costa counties.

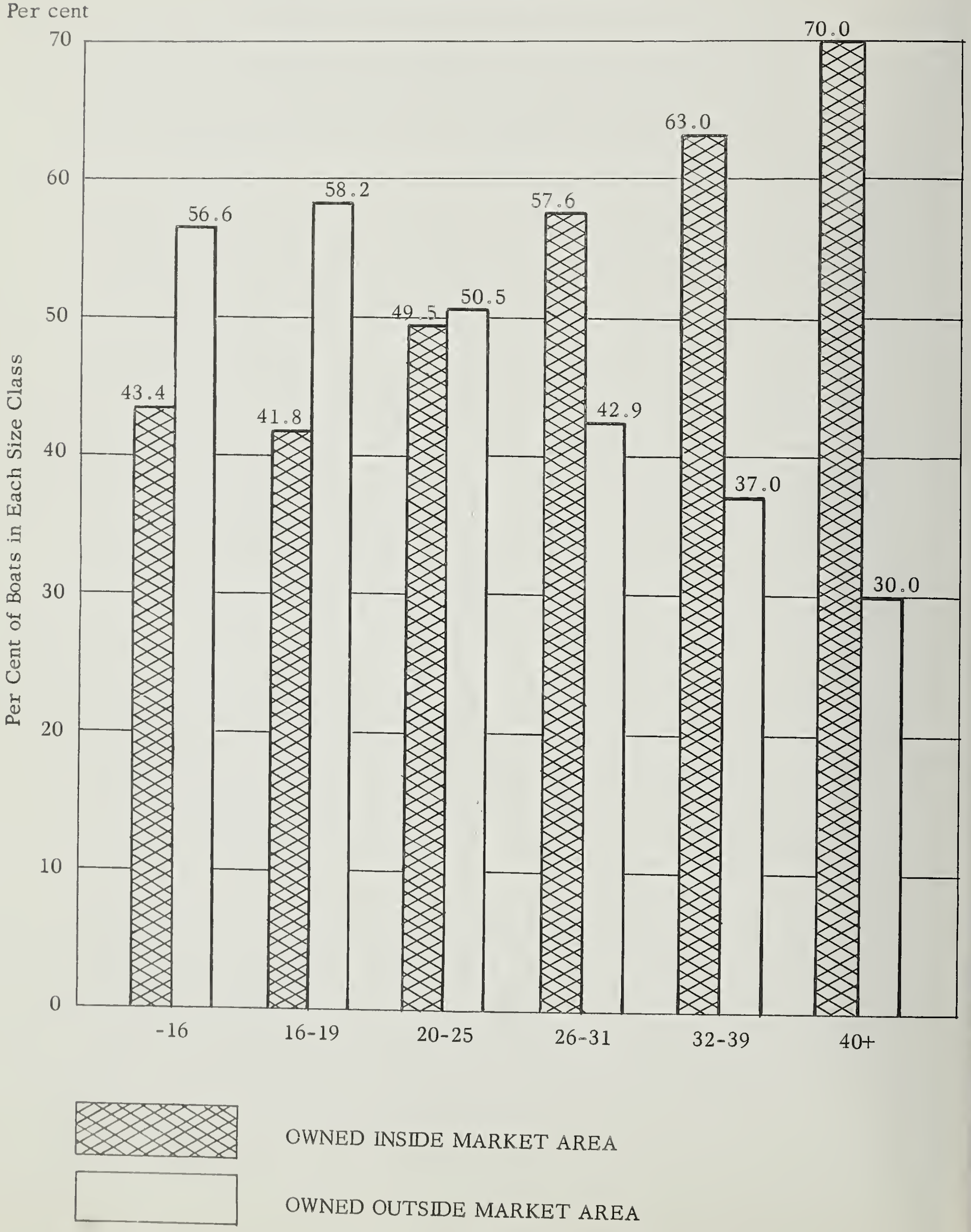
The market area allocated by the Division of Small Craft Harbors admittedly is arbitrary; but it was considered necessary for administrative purposes. The "assigned market area" apportions a section of East Oakland to the proposed San Leandro marina, but boat registration data were reported only for Oakland as a whole. With the assent of the Division of Small Craft Harbors' economist, all of Oakland was included in the survey and the final estimates were adjusted to delete the demand for Berkeley berths that would come from East Oakland owners. The entire area including East Oakland is referred to as the "market area", and the smaller area is called the "assigned market area". Although about half of all boats in the two counties are owned by non-market area residents, these boats tend to be smaller in size than those owned by people who do live within the market area. Counting only those boats for which owners' addresses are known, about 60 per cent of the boats over 26 feet in length, all of which require berths, are owned by market area residents. In the under 16-foot class, only about 43 per cent are owned within the market area.

Almost 9,200 boat owners who live within the market area had registered their boats with the State as of June 30, 1960. These comprise about 42 per cent of the 21,780 undocumented boats that were registered to residents of Alameda and Contra Costa counties. The balance of the counties' boats are owned by persons living outside the market area (11,638 boats, or 53 per cent) and by persons whose addresses were not reported (963 boats, or 5 per cent), some of whom are market area residents. Appendixes 4 and 5 present these data in detail.

Because the boat registration program is not yet complete, it is not known how many boats actually are owned by county residents or by market area residents. However, on the basis of an independent check of boats recorded by the Contra Costa County Assessor, we estimate the August 1, 1960, total to be in the neighborhood of 23,000, or about 5 per cent more than the June 30th registration.

PERCENTAGE DISTRIBUTION OF BOATS

Percentage distribution of boats owned by Alameda and Contra Costa County residents, for whom addresses are known



Conduct and Findings of the Survey

From the State's small craft registration files of undocumented boats, a random sample was selected from among those boat owners who live within the market area and whose boats are reported to be 16 feet in length or longer. The random sample of 144 boat owners was stratified to assure that boats in each size-class would be proportionately represented and that boats owned by residents of each of the 12 market area communities (see Appendix 4) would be proportionately represented. The sample was designed to ensure that 95 times out of 100 the sampled boat owners would be representative of the total market area's boat-owning population.

Boat owners in the sample were then interviewed by telephone. As many as nine calls were made, when necessary, in an attempt to reach each owner. The interviews were carefully conducted to avoid biasing the boat owners' responses either in favor of or against berthing at Berkeley. A list of the interview questions is included as Appendix 6. After a preliminary query about desired marina facilities, each boat owner was asked a series of questions about his boating activities and about his preferences for boating locations and for berthing facilities. In answer to the subsequent direct question, "If berthing facilities were available at the Berkeley Yacht Harbor, would you berth your boat there?" 21.5 per cent of the respondents said they definitely want to. An additional 9.6 per cent also said they would berth at Berkeley; but in the interviewer's judgment these were less positive, and therefore they were not counted in deriving the minimum estimate of demand.

At the 95 per cent level of reliability, the 21.5 per cent strong affirmative answers indicate that, within a probable maximum error of plus or minus 42 boat owners, 623 would prefer to berth their boats at the Berkeley Harbor and would lease berths there if they were available today. Assuming the minus 42 figure rather than the equally likely plus 42 figure will prevail, there are at least 581 owners of registered boats that would prefer to keep their boats at Berkeley.

Of course, it is very easy for a person to say "yes" in a telephone interview that does not obligate him to sign a lease. It is also likely that some who firmly prefer a Berkeley berth now would later change their minds when new and improved marinas are constructed at San Leandro, Alameda, Oakland, and Richmond. However, we have considerable confidence in the 21.5 per cent "emphatic yes" responses. Typically they were accompanied by unsolicited statements about Berkeley's proximity to the good fishing areas, the immediate access to open water, the easy accessibility from the Eastshore Freeway, and the desirable conditions outside the harbor for sailing. The Berkeley Harbor seems to enjoy certain advantages, especially for large boats, that are not shared by marinas at other locations; and the strong affirmative responses usually were from boaters who are familiar with the conditions there.

Additional Demand for Berths

In addition to the sampled group of registered boats exceeding 16 feet in length and owned by market area residents, the study also must account for

(1) Boats documented by the federal government;

(2) Registered boats owned by people living outside the market area;

(3) Unregistered boats for which there is no detailed information available;

(4) Registered boats for which owners' addresses are unavailable;

(5) Registered but unsurveyed boats under 16 feet in length;

(6) New boats that will be purchased within the next few years; and

(7) Other boats that will be attracted by the new harbor improvements.

(1) Boats documented by the federal government.

A separate accounting must be made of boats that are not included in the State's registration files, since State law requires registration only for boats not documented by the federal government. The number of documented boats has been increasing as the stock of large boats has grown and as boat owners have chosen the federal rather than the new State registration method. As of mid-August there were 48 documented boats at the Berkeley Harbor, 38 of which were owned by market area residents and 10 by residents of other areas. Included were 29 fishing and party boats that serve the tributary population and can be expected to remain. Also included were several large boats for which adequate berthing elsewhere would be hard to find. Appendix 7 lists types and lengths.

The large boats are unlikely to leave Berkeley, although some of the medium-sized vessels owned by recreational boaters who live in other counties may be moved to marinas nearer their homes when space becomes available there. Assuming for the minimum estimate that two-thirds of the documented boats owned by market area residents will remain and that only half of the others will remain, Berkeley may count on an additional 31 boats. For the probable estimate it seems reasonable to assume that all of the documented boats will remain at Berkeley.

(2) Registered boats owned by people living outside the market area.

Twenty-one registered boats presently berthed at Berkeley are owned by persons living outside the market area. (Appendix 7.) Seventeen are owned by San Francisco residents, and it is possible that some of these boats will be moved when planned new marina facilities are constructed there. It is not possible to estimate with any confidence how many non-market-area residents will choose Berkeley when the currently accelerating expansion of Bay Area harbors is completed, but it is certain that there will always be some who will prefer to berth at Berkeley, irrespective of the quality or capacity of nearby marinas. For the minimum estimate half were assigned to Berkeley. For the probable estimate all 21 were allocated.

(3) Unregistered boats for which there is no detailed information available.

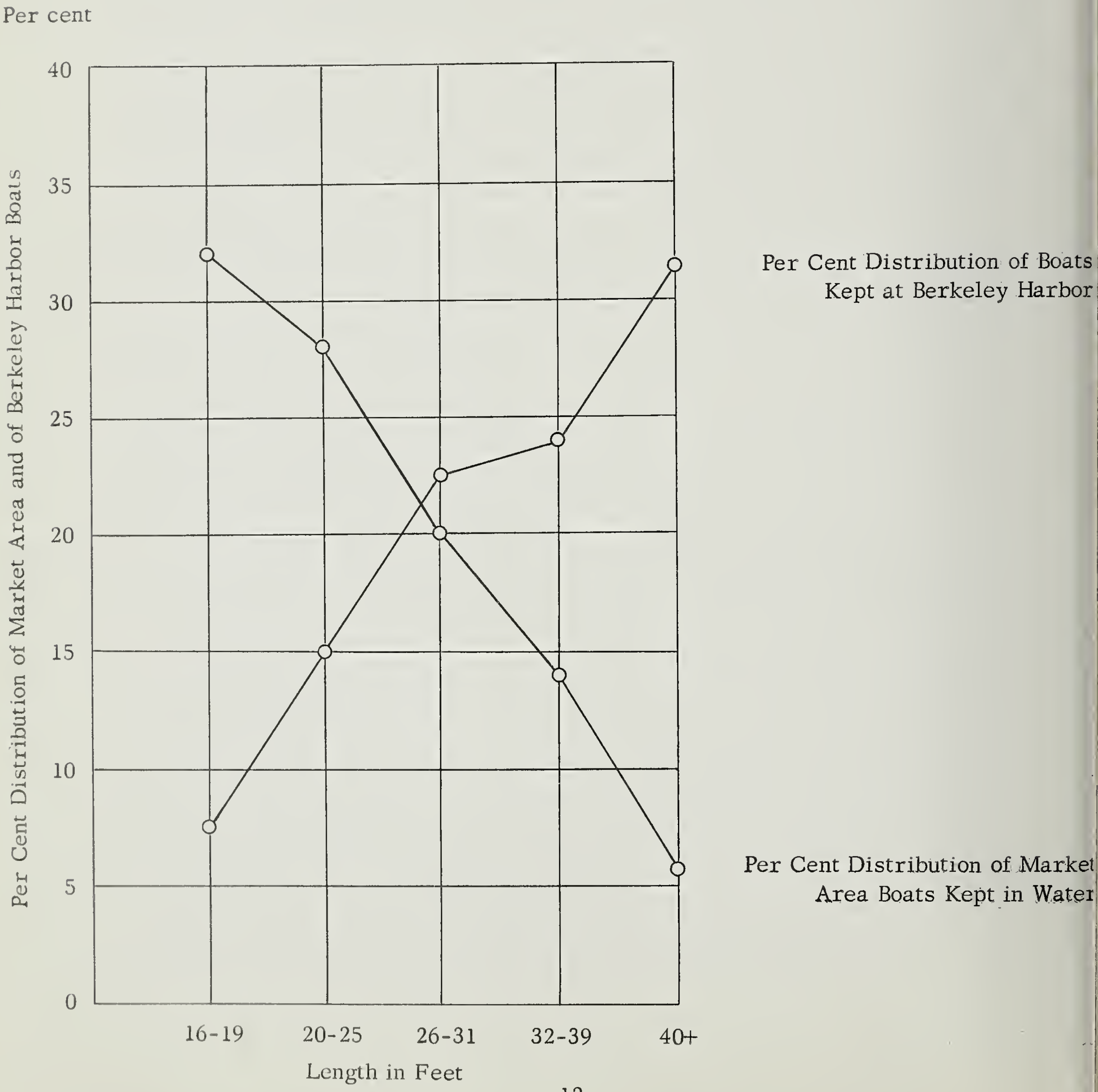
Assuming that boats that have not yet been registered are distributed among the cities and among the length classes in the same proportions as are the registered boats, and assuming that owners of unregistered boats who live in the market area would express the same preferences for the Berkeley Harbor as those interviewed, there will be a demand for an additional 30 berths. This estimate may be high because unregistered boats may tend to be smaller; so only two-thirds were included for the minimum estimate.

(4) Registered boats for which owners' addresses are unavailable.

The registration records supplied by the Division of Small Craft Harbors include only partial information for 963 boats owned by Alameda and Contra Costa county residents. Where the addresses were omitted, it was not possible to determine whether the owners live in the market area. These 963 boats comprise 4.4 per cent of all boats owned by residents of the two counties, but they include a much higher proportion of large boats that require berthing spaces than does the group for which addresses are available. Whereas 11.3 per cent of the located boat owners have boats over 20 feet in length, 26.2 per cent of the un-

PERCENTAGE DISTRIBUTION OF BERTHED BOATS

Percentage distribution of berthed boats, over 16 feet, owned by market area residents, compared with percentage distribution of boats berthed at Berkeley Harbor (registered and documented combined): June-August 1960



located boat owners have boats in this class. (Appendix 5.) Therefore, this group includes a higher proportion of potential candidates for Berkeley berths than does the interviewed sample.

These owners appear to be predominantly business firms, institutional groups such as boating clubs, and partnerships of two or more individuals who jointly own a larger-than-average boat. Because market area residents whose addresses are available own most of the large boats registered to residents of the two counties, it seems reasonable to assume that the residences of unlocated owners are distributed similarly. On this basis, the unlocated owners can be assigned to the market area in the same proportion as the located owners, to yield an estimated 226 additional boats over 16 feet in length. If these had been included in the survey and if the owners had indicated preferences for the Berkeley Harbor in the same ratio as those interviewed, there would be an additional demand for 53 berths. Using the cautious assumption for the minimum estimate that only two-thirds of this anticipated demand would be realized, resulted in a market for at least 35 additional berths.

(5) Registered but unsurveyed boats under 16 feet in length.

Owners of boats that are shorter than 16 feet were not interviewed. Those whose boats are in the 16 foot to 19 foot class, however, indicate a remarkably high preference for berths. Over one-fourth of them state that they now keep their boats in the water.

The habits of owners of portable boats are quite varied. Some like to try different lakes and rivers from time to time, and these people usually keep their boats on trailers at home. Others who do all or most of their boating at one place find it more convenient to store their boats at harbors. If they use their boats frequently, accumulated launching fees make it cheaper to rent dry storage facilities that include launching privileges or to keep their boats in the water.

Nearly a fifth of the survey respondents in the 16 foot to 19 foot class indicated preferences for berths at Berkeley. It is possible that many owners of boats just under 16 feet in length prefer berths. Since over two-thirds of all boats owned by market area residents are under 16 feet, it would take only a small percentage of these 6,283 registered boats to fill any marina planned. In the interest of conservatism, and because no firm basis for estimating is yet available, no quantitative estimate of this market for Berkeley berths was made, but the fact that the Berkeley Harbor already has 80 boats 16 feet and under stored in the water indicates a substantial demand.

(6) New boats that will be purchased within the next few years.

No published data on Bay Area boat sales are available, and there are no trend data on Bay Area boat ownership. The national boat sales spurt obviously has been reflected in local sales and has contributed to the current pressure on Bay Area marina facilities. But until accurate information can be developed, and preferably for the East Bay specifically it is not possible to construct forecasts of boat ownership reliable enough to serve as a basis for public investment. It should be sufficient to realize that the popularity of boating seems to be stable, that the Bay Area's population growth is continuing unabated, and that per capita ownership ratios are rising as a concomitant of rising per capita income and increasing leisure time.

Although most of the new boats being purchased are of the small, portable types, it appears typical for the enthusiastic boater to trade-in his present model for a better one, and as a consequence a lively used boat trade has developed. The new boat usually is larger. There is a small but significant number of people who can afford to buy boats exceeding 26 feet in length, and there is potentially a very large number who wish to buy a large boat in partnership with a friend. But, however they may be acquired, the number of large boats certainly is increasing; and for every boat exceeding 26 feet a berth is a necessity.

(7) Other boats that will be attracted by the new harbor improvements.

Probably the most important single contributor to the future demand for berthing space at the Berkeley Harbor will be improvement of the harbor itself. Well over half of the owners interviewed volunteered the opinion that the harbor entrance presently is very difficult to navigate. Sailboat owners, especially, told of the difficulties of maneuvering to get out of the entrance against head-on winds and waves. The proposed breakwater should ease navigation greatly, and some boaters who previously were discouraged will return to Berkeley. The wind and wave problems outside the harbor entrance will continue to be difficult for the smallest boats in the late afternoon and the evening hours, but most of the complaints that were expressed during the interviews concerned the entrance rather than the Bay waters outside the harbor.

The number of berths that will be sought by boat owners who will be attracted by the harbor entrance improvements cannot be estimated. Similarly, it is impossible to measure the influence that improved and expanded supply and maintenance facilities and enhanced appearance and convenience will have. But there can be no question that these will make the Berkeley Harbor much more attractive to boaters.

Adding the total minimum demand derived from items (1) through (4) to the minimum of 581 derived from the survey yields a market for at least 677 berths. Adding the probable demand from items (1) through (4) to the probable figure of 623 from the survey indicates a likely market for 775 berths. (These figures include the demand created by Oakland residents east of High Street.)

Negative Demand Factors

Nine of the other 24 small craft harbors in the market area have new berths under construction or in the planning stage. There are currently 1,631 berths available within the market area. Some 317 additional berths are now under construction, and 1,105 more are being considered. The City of San Leandro has filed an application with the State Division of Small Craft Harbors for construction of 600 berths. The City of Richmond is preparing plans, although construction is not anticipated in the near future. The table on the following page lists existing and planned facilities.

It is impossible to know how many of the interviewed boat owners would change their minds about their preferences for Berkeley, once these new facilities are visible; but it is doubtful that a large proportion of them would. Their preferences are based primarily on the locational advantages that the Berkeley Harbor enjoys, rather than on the relative amenities of marinas or on proximity to their homes. But, unquestionably, some unknown number of respondents would change their stated preferences and choose another harbor. However, the proposed expansion and improvement of the Berkeley Harbor will provide facilities at least as attractive as those offered at other locations. If rental rates are similar and management efficient, the only loss of potential patronage would be among owners who find some other location more convenient.

It may be said that the Berkeley Harbor's unique assets and liabilities resulting from its location eliminate direct competition from other harbors. For some users, its accessibility by car and convenience to good sailing and fishing waters make Berkeley the inevitable first choice. For others, the rough water automatically disqualifies Berkeley as a candidate for their patronage. It is unlikely that similarly located competing harbors will be built in the near future. The pattern of railroad ownership of tidelands leaves very few potential sites within five miles of the Berkeley Harbor.

SMALL CRAFT HARBORS SERVING THE MARKET AREA

Location	Number of Berths			Mooring Charge (per foot per month)	Fuel	Off-Street Parking Provided	Repair Facilities	Launching Facilities	Restaurant	Boat Sales	Chandlery
	Present	Under Con-struction	Under Con-sideration								
Point San Pablo Yacht Club, Point San Pablo, Richmond	83			$.55 to .60	x	x	x	x	x		x
Herman's Slough, Gertrude Avenue, Richmond	20					x		x			
Standard Oil Gun Club, Point Richmond, Richmond	100					x		x			
Richmond Yacht Harbor, 320 West Cutting Blvd., Richmond	54			.50 to .65		x		x			
Richmond Yacht Service, Canal and Cutting Blvds. Richmond	52			.60	x	x	x	x		x	x
Richmond Boat Works, 616 Cutting Blvd., Richmond	8			.50			x	x			
Pacific Boat Works, 610 Cutting Blvd., Richmond	4			.50	x	x	x	x		x	x
Naylor's Marina, Cutting Blvd., Richmond	50	100		.65	x	x		x			
BERKELEY HARBOR, University Avenue, Berkeley	215		285	.62	x	x	x	x	x	x	x
Sundeck Yacht Harbor, Ferro Street, Oakland	30			.50			x	x		x	
Nichols Boats, 77 Jack London Square, Oakland	8			.50		x	x	x			
Webster Yacht Harbor (Thrall-Hurst Boats), Jack London Square, Oakland	12	75	225	.75		x				x	

Kamelhart Marine Ways, 280-6th Avenue, Oakland	22			.50		x	x	x			
Basincraft Boats, 601 Embarcadero, Oakland	12			.40			x			x	
Oakland Marina, 1311 Embarcadero, Oakland	150	20		.50 to .75	x	x	x	x	x	x	x
Metropolitan Oakland Yacht Club, Embarcadero, Oakland	(Included in Oakland Marina)					x					
Dick Peterson Yacht Sales, 1363 Embarcadero, Oakland						x	x	x		x	x
Tiny's Harbor, 1721-1/2 Embarcadero, Oakland	60	20		.50			x	x			
Oakland Yacht Club, 1045-19th Avenue, Oakland	84					x					
Red Tompkins Yacht Sales, 919-19th Avenue, Oakland	30	20		.50	x	x				x	x
Webster Yacht Harbor, 2394 Webster Street, Alameda	34			.75		x	x	x		x	
Pacific Marina, Sherman Street, Alameda	205		595	.75	x	x		x	x		
Encinal Yacht Club, Sherman Street, Alameda	(Included in Pacific Marina)					x					
Alameda Yacht Club, 1535 Buena Vista, Alameda	270			.50	x	x	x	x		x	x
Wards Marina, 2016 Park Street, Alameda	23	47		.50		x	x	x		x	x
A.A. Alameda Shell, Park Street and Blanding Avenue, Alameda	15	35		.75	x	x	x	x	x	x	x
Aeolian Yacht Club, Airport Bridge, Alameda	20					x					
TOTAL	1,631	317	1,105		10	23	16	20	5	13	10

Adjustments to Delete East Oakland Demand

The form of the State's registration data made it necessary to include within the market study area the parts of East Oakland that the Division of Small Craft Harbors has allocated to the San Leandro marina. The interviews with East Oakland owners were conducted in the same manner as were all others. Yet, although they own only about a third of Oakland's boats and although their boats tend to be smaller than the rest of Oakland's, they contributed almost half of the Oakland preferences for Berkeley berths. Obviously this raised questions about the appropriateness of excluding these owners from the Berkeley Yacht Harbor's assigned market area.

Therefore, an additional sample of East Oakland boat owners was drawn and interviewed. These interviews were conducted just as the others were, but at the end of the interview those who had said they preferred Berkeley were told about San Leandro's proposed marina and asked whether they would not prefer to locate there instead. None changed his statement of preference for Berkeley. Of course, this is no assurance that they would not do so when the closer facilities were available; but, again, the owner typically volunteered his opinions about the quality of Berkeley fishing, about the short travel time made possible by the freeways, and about the advantages for sailing from Berkeley.

If these responses are deleted, nonetheless, the estimated minimum demand is reduced by an even 100 boats to 577. For purposes of the probable estimate, 50 East Oakland boats may conservatively be counted among the candidates for Berkeley's berths. This yields a net probable demand for 725 berths.

Independent Check on Expressed Demand for Berths

The waiting list of applicants for berths at the Berkeley Harbor contained 176 names as of mid-August, 1960. The Harbormaster reports that only one-fourth of those who request accommodations file an application when it is learned that there will be a long delay. Because there is a shortage of berths, many boat owners apply at several harbors in order to obtain space as soon as possible.

In an effort to determine the vitality of the waiting list for Berkeley Harbor berths, a random sample of a dozen owners from this list was interviewed by telephone. The purposes were to determine whether they are still seeking a Berkeley berth and whether they would still choose Berkeley if space at another harbor also were available. Without exception, each owner interviewed was prepared to move his boat to Berkeley immediately. If the sample was representative of all those on the waiting list, it can be expected that most of the persons on the list would rent berths at Berkeley today if they were available. Since those on the waiting list are included in the larger population of boat owners from which the larger sample was taken, the waiting list cannot be added to demand estimates based on the larger sample. However, the waiting list interviews substantiate the strength of the demand.

Summary of Survey Findings:

THE POTENTIAL DEMAND FOR BOAT BERTHS AT THE BERKELEY HARBOR

	Minimum Level	Probable Level
BOATS OVER 16' IN LENGTH (Present Demand)		
Registered boats owned by market-area residents who state a strong desire to berth at Berkeley (based on sample survey: 623 boats ± 42 boats = 581-665)	581	623
1. Documented boats		
a. Owned by market area residents and now berthed at Berkeley (38, but assume 2/3 in minimum estimate)	+26	+38
b. Owned by persons outside market area and now berthed at Berkeley (10, but assume 1/2 in minimum estimate)	+5	+10
2. Registered boats, owned by persons outside market area		
a. Now berthed at Berkeley (21, but assume 1/2 in minimum estimate)	10	21
b. Now berthed elsewhere, but Berkeley berth is now preferred		+ x
3. Unregistered boats owned by market area residents assuming same distribution as registered boats: (30, but assume 2/3 in minimum estimate)	20	30
4. Registered boats for which addresses are unavailable (Berkeley Harbor share = 53, but assume 2/3 in minimum estimate)	35	53

+ x denotes additional boats for which no quantity can be estimated.

- y denotes fewer boats for which no quantity can be estimated.

	Minimum Level	Probable Level
BOATS LESS THAN 16' IN LENGTH (Present Demand)		
5. Registered, but unsurveyed boats		
a. Others, owned by market-area residents who now desire berths		+ x
b. Others, owned by persons outside market area who now desire berths		+ x
FUTURE CONTRIBUTORS TO DEMAND		
6. Additions resulting from rising trends in per capita ownership		+ x
7. Additions resulting from improvements in		
a. Harbor entrance (especially for sail and small boats)		+ x
b. Ancillary harbor services and facilities		+ x
SUBTOTALS	677	775+x's
NEGATIVE DEMAND FACTORS		
8. Effect of new and expanded East Bay small craft harbors	- y	- y
9. Effect of deleting East Oakland portion of demand expressed in sample survey (see text)	-100	-50
SUBTOTALS	577-y	725+x's-y
POSSIBLE ADDITIONS TO PRESENT DEMAND		
10. Possible additional demand from boat owners living in the market area who state a less-than-strong desire to berth at Berkeley (based on sample survey: 282 boats ± 43, but assume 1/2 for minimum estimate and 2/3 for probable estimate)	+141	188
TOTAL	718-y	913+x's-y

DEVELOPMENT PLAN

The development plan (see drawing, following page) illustrates optimum development of the present basin. Some of the facilities are proposed to be constructed by the City using a loan by the Division of Small Craft Harbors, some by City funds, and some by private enterprise. The plan provides for staged construction as funds become available. A first stage project feasible for State financing is indicated on the plan. New berths and concessions are so located that existing facilities essential to provide service and maintain revenue need not be disturbed during construction. The plan provides for as many revenue-producing concessions as the improved harbor can support. The greater the concession profits to the City, the better the marina that can be provided on a break-even basis. Where possible, harbor development has been confined to City-owned land in order to minimize costs.

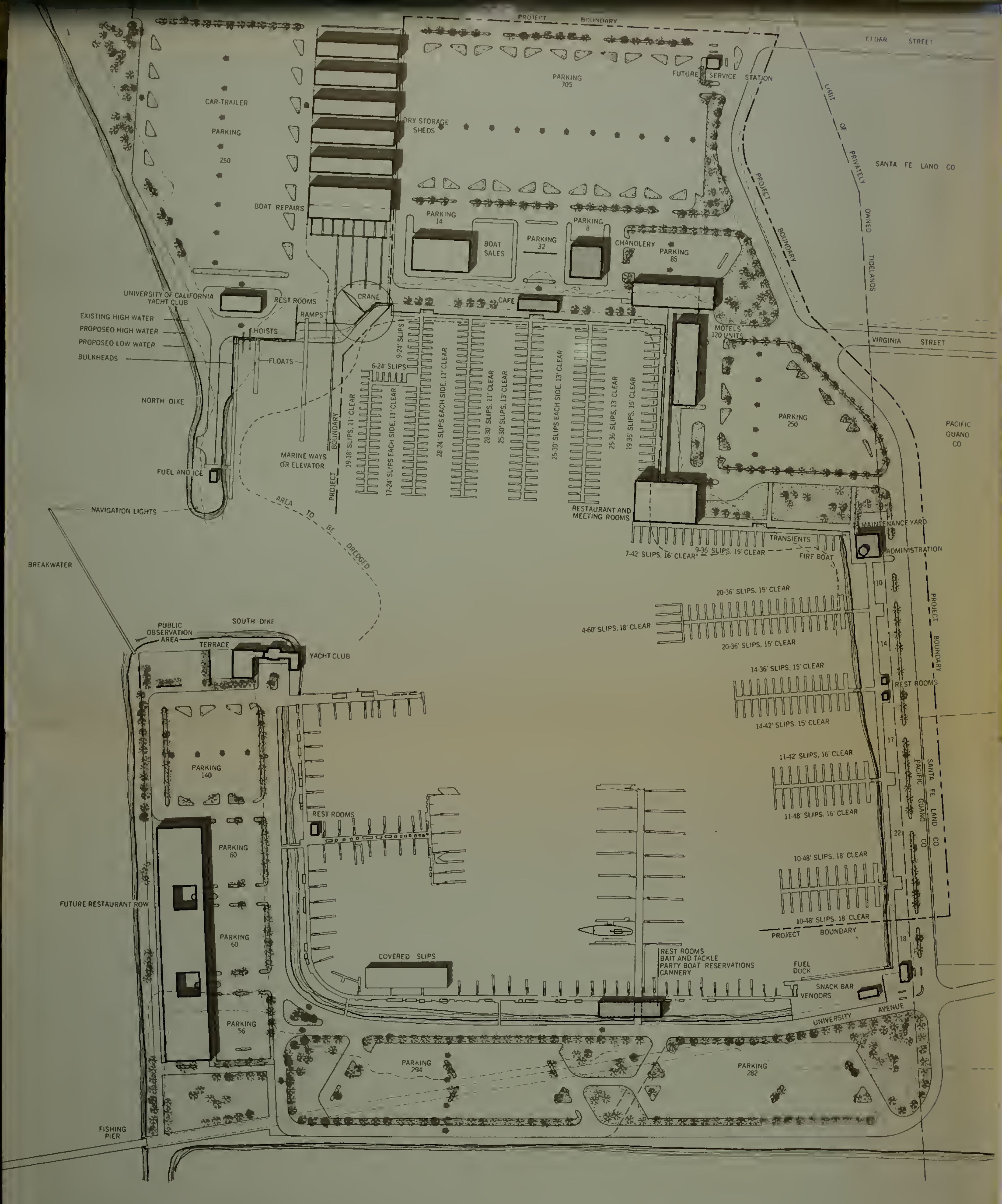
Harbor

The protected water area of 50 acres measures 1,400 feet east-west and 1,700 feet north-south with a 300 foot opening on the west. The central area originally was dredged to -20 feet MLLW and has not required maintenance. Areas close to the dikes vary from -4 feet to -7 feet MLLW, partially as a result of failure of the inner face of the dikes. The north half of the harbor has never been dredged and has an average depth of -6 feet MLLW. This area is directly exposed to the strong west wind and swell and currently is unsuitable for small craft berthing.

Originally there was no land adjoining the harbor, and the old ferry causeway provided the sole access and the only space for parking and buildings. Recently, sanitary fill has been completed on land owned by the Santa Fe Railway and the Pacific Guano Company extending from the Eastshore Freeway to the east edge of the harbor. Fifty acres of City-owned land north of the harbor has been diked and pumped dry for sanitary fill.

The existing basin could accommodate at least 800 boats if the following improvements were made:

- Improvement of the harbor entrance to protect the north section of the basin from the western swell and thus make it usable for berths.



BERKELEY MARINA DEVELOPMENT PLAN

- Construction of stable dikes that would permit maintenance of adequate depth over the entire water area.

- Reconstruction of existing berths to make more efficient use of space.

- Filling sufficient adjoining land to provide space for parking and service facilities.

Entrance

Four alternate schemes for improvement of the entrance were studied. The primary objective was to make the entire basin available for berthing, and the secondary consideration was to make navigation easier, particularly for sailboats. Current landfill operations eliminated the possibility of moving the entrance to the north side of the harbor. Relocating the entrance on the west side still would leave a portion of the harbor exposed to the prevailing westerly swell. Thus, some type of barrier across the present entrance is necessary. A single offshore breakwater open to the north and south would be satisfactory. However, the need for additional land adjoining the basin led to studies of the cost of connecting the breakwater to either the north or south edge of present entrance. A dike with a timber breakwater extension was selected as the optimum scheme considering all factors: basin protection, navigation, land development, and construction and maintenance costs. The dike is to extend 275 feet due west of the Yacht Club, and from this point a timber pile breakwater would extend 400 feet northwest.

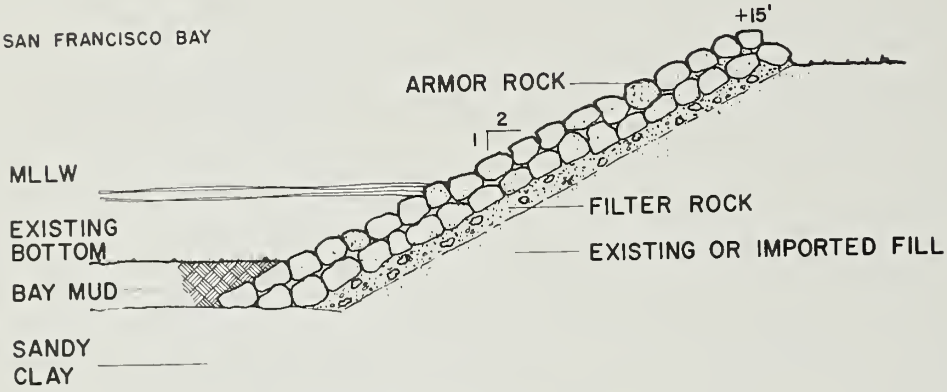
Slope Protection

A vertical bulkhead would provide the ideal slope protection, but the cost cannot be justified. Instead, a rubble dike, as shown on the following page, is proposed. Great progress recently has been made in the design of rubble dikes, and if the outer rock is heavy enough and an adequate filter blanket is placed beneath the armor to prevent the fine interior material from washing through, practically no maintenance is necessary.

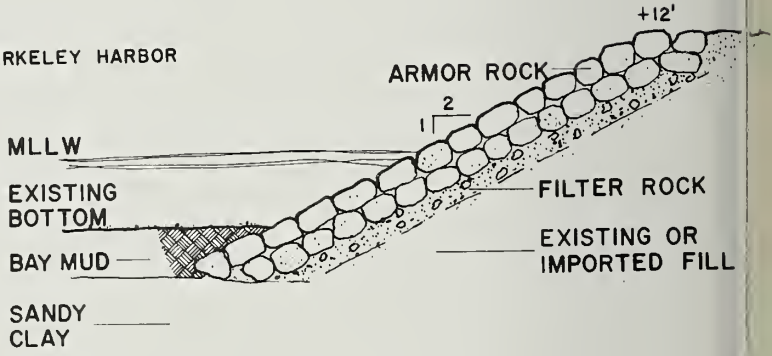
Berths

The present berths provide a single floating finger serving each two boats. The finger is connected to a fixed pier by a gangway. Water connections are provided at 40 foot intervals along the piers, and electricity is available to berth tenants by special arrangement. The plan proposes rehabilitation and continued use of the present piers and slips.

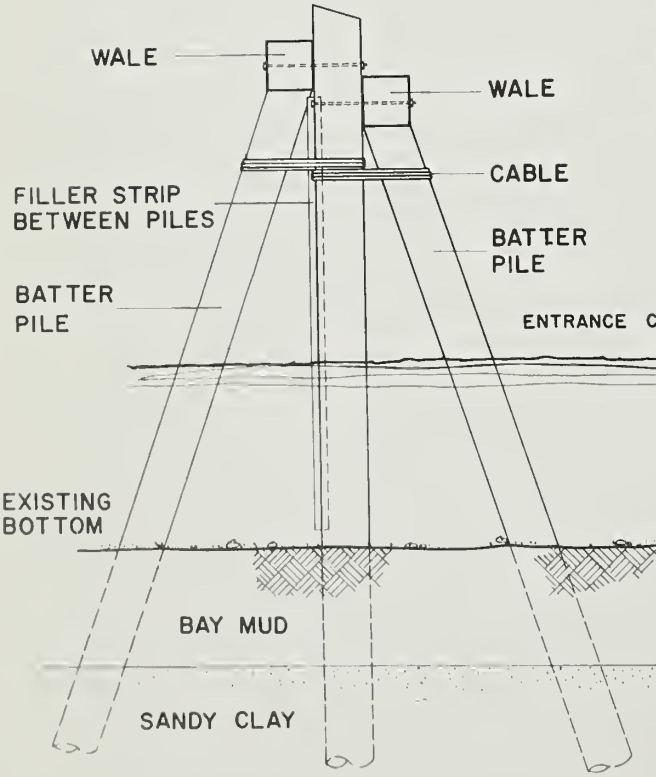
SLOPE AND BREAKWATER DETAILS



BAY SLOPE PROTECTION



BASIN SLOPE PROTECTIO



TIMBER BREAKWATER

All construction for the 403 new berths is proposed to be floating. This is the universal practice in recent small craft harbor construction on the West Coast. Floating piers definitely are preferred by boaters, and the initial cost is lower than for fixed piers. The proposed system allows long, wide gangways that make it possible to get heavy or bulky equipment to the berths safely and conveniently. Gangways from fixed piers to floating fingers must be narrow and steep unless very wide fingers and special landing floats are provided. The boat owner who does his own maintenance does not want to contend with a gangway that occupies the major portion of the finger or to climb up to the fixed pier each time he has to unplug his sander, turn on the water, or empty the trash. Floating construction allows fire extinguishers to be wheeled quickly to the boats and eliminates the possibility of boats drifting under fixed piers and being damaged as the tide rises.

Single slips (fingers on both sides of each boat) are proposed because they permit easy maintenance, although cost could be reduced slightly by using double slips. Single slips are becoming standard, and eventual conversion probably would be required if double slips were installed now.

Cost estimates assume treated timber construction with polystyrene flotation. Gangways are to be timber, and piles will be treated douglas fir. Certain other available construction materials have a longer life and some are better looking, but higher berthing rates would have to be charged if any of these more expensive materials were used. There will be water and power outlets at each berth, and reasonable usage is included in the proposed monthly rent. Covered berths are not shown on the plan or included in the cost estimates. However, they could be provided adjacent to the present covered berths at the southwest corner of the harbor or near the Yacht Club as demand warrants.

The plan locates the larger berths along the east shore of the harbor because the water is deep there and no dredging will be required, and because limited space is available for parking nearby. Although large boats require more parking spaces per boat, in a given area the lesser number of boats berthed would reduce the parking demand below the amount that would be needed by small boats. The available berthing area along the east shore is limited by the existing dock projecting from the south shore.

The drawing following page 26 shows slip details. Two types of lockers are shown. Small lockers can be put on the fillet at the head of each berth. The system in effect at the Palo Alto Yacht Harbor is recommended: the maintenance staff builds small lockers during slack periods or the City has them built to a standard design. Boat owners wishing individual lockers make a single payment covering the cost. Large lockers, similar to those now at the harbor, also would be available for rent. Near the shore end of each main float will be large chemical fire extinguishers, service carts, garbage and trash cans, and possibly a pay telephone.

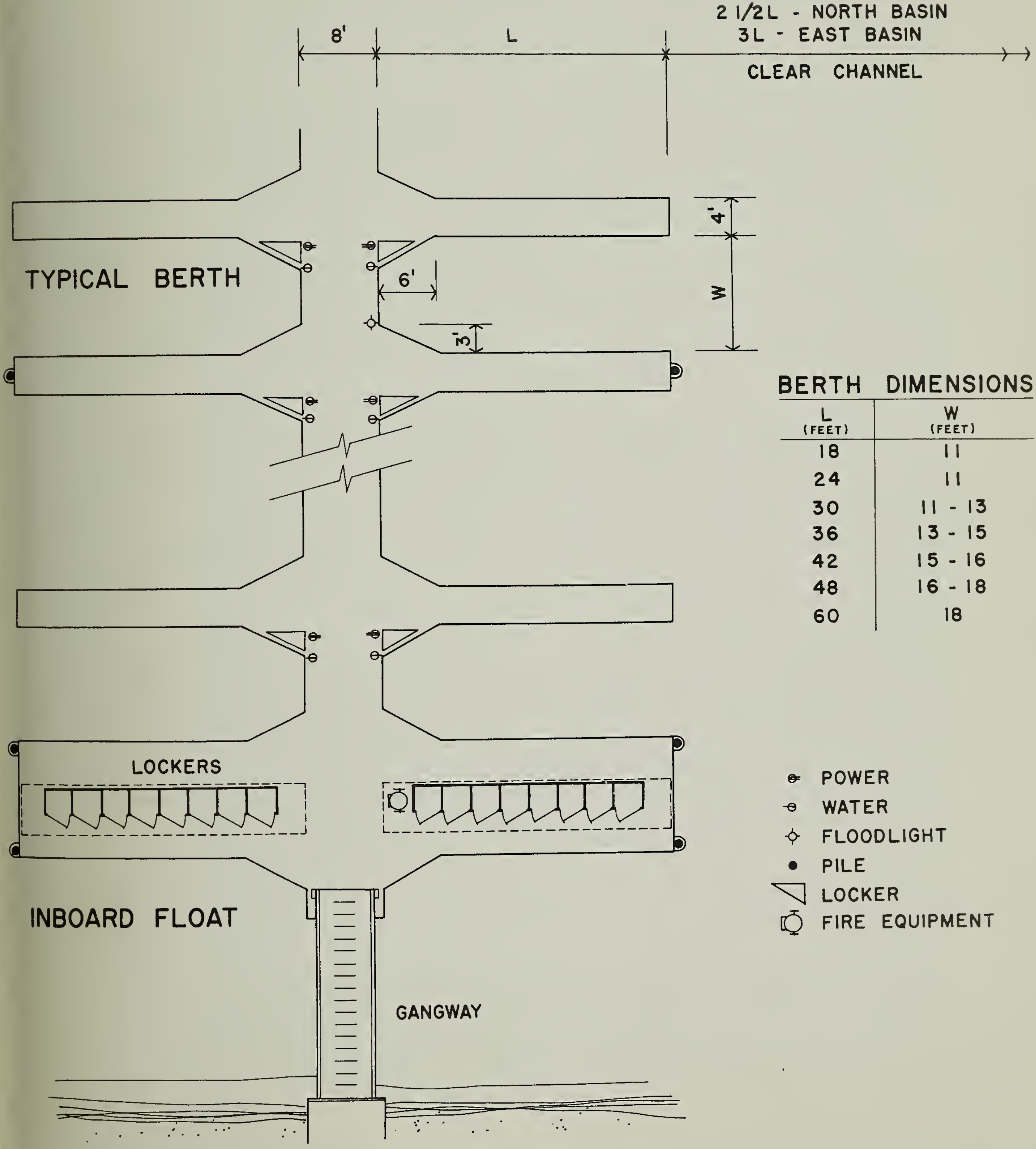
The table below shows the sizes of berths to be provided:

EXISTING AND PROPOSED BERTHS

Slip Length	Number of Berths		
	Existing	Proposed	Total
18		19	19
20	20		20
24		105	105
30	38	103	141
36		109	109
40	70		70
42		32	32
48		31	31
50	67		67
60		4	4
65	9		9
TOTAL	204	403	607

Note: 76 skiff berths not included.
Two berths are for harbor administration use and are not included in income calculations.

BERTH DETAILS



BERTH DIMENSIONS

L (FEET)	W (FEET)
18	11
24	11
30	11 - 13
36	13 - 15
42	15 - 16
48	16 - 18
60	18

⊖	POWER
⊖	WATER
⌖	FLOODLIGHT
●	PILE
◸	LOCKER
⚲	FIRE EQUIPMENT

Launching

The present launching ramp in the southeast corner of the harbor is paved but has no adjacent floats. About 50 boats now are launched each weekend. Adequate nearby parking for trailers has been available only since completion of a paved lot in the summer of 1960. The ramp parking area is on Santa Fe property, and the Company may terminate it on 30 days' notice.

The plan relocates launching facilities at the northwest corner of the harbor, where ample parking can be provided on City land and where proximity to the harbor entrance will reduce congestion in the basin. Two ramps and two hoists are shown, and space is available for an additional ramp or hoist if sufficient demand should develop.

It is virtually impossible to forecast the volume of small boat launching. Owners of boats in the smaller size classes were not interviewed in the market survey because their present views would not be reliable indications of their actions after the harbor has been improved and new launching facilities installed. Construction can be staged to keep pace with demand.

The ramps will be constructed on imported fill and will be made of concrete. The inshore portion of a large float separating the two ramps will be used by persons assisting the launching; boats will be stored along the offshore portion while the boat owner is parking or retrieving his car. Hinged sections at the inshore edge of the float will keep it at water level adjacent to the trailer regardless of the height of the tide. Each ramp will have a capacity of 10 to 12 boats per hour.

A monorail type hoist at the edge of a vertical bulkhead would be operated by trained personnel. Storage floats would be provided. The speed of launching and retrieving with a hoist is highly variable, depending on the type of equipment, the personnel, and the size and type of boats. New types of equipment continually are being developed. Therefore, staged construction is worthy of serious consideration. Initial construction of new launching facilities should include the two ramps and the hoists could be added later.

Repair and Storage

The present repair shop is in a small covered shed at the southeast corner of the harbor. There is no yard, and only one boat at a time can be repaired because all work must be done while it is suspended by the single hoist. Sailboats cannot be accommodated without removing their masts; so this business goes elsewhere. Some storage space is available in an adjoining larger building, but it is not suitable for owners who use their boats occasionally and want dry storage rather than a berth. The storage shed is deteriorated and should be removed.

The plan moves the repair and storage facilities to the northwest of the harbor, the only area where sufficient space is available. This location, near the launching ramps and hoists and marine fuel and ice station, permits maximum flexibility of operation. The facilities provided are extensive enough to attract outside patronage as well as to serve boats berthed at Berkeley. A crane at the edge of a vertical bulkhead would lift the smaller boats directly from the water to a cradle. Owners wishing to do their own work could rent space and equipment in this area. The plan shows a marine railway for handling larger craft which would be moved to one of 11 storage areas for repair. Eight rails are provided for boats up to 40 feet and 3 rails for boats up to 60 feet.

To the north of the repair building, five open sheds would provide storage for boats on the owners' trailers or on special dollies or cradles. Monorail systems have been developed that will deliver boats directly from a "pigeonhole" in a storage building to the water. If a monorail is not built, the nearby launching ramps and hoists can be used. The repair and storage areas are to be enclosed by a chain link fence for security.

Boat Circulation

Of the proposed new berths, two-thirds (18 feet to 36 feet) are in the north section of the harbor and one-third (36 feet to 60 feet) are in the east section. Thus almost half of the total berths will be close to the harbor entrance. Location of new launching facilities near the entrance will minimize the conflicts between berthed boats and boats stored on land. The proposed fuel and ice dock near the entrance will enable berthed craft to fuel on the way out of the harbor. Most trailer-borne boats will be fueled at service stations on shore, although the fuel dock will be convenient to the launching area. A second fuel dock at the southeast corner of the harbor would cater to larger private craft, and fishing and party boats that require diesel fuel and are berthed nearby. The expanded harbor probably also will be able to support a small fueling boat to serve larger boats at their berths.

Exposure of the harbor to the prevailing westerly swell creates problems for sailboats that cannot be entirely solved. Sailboats leaving the harbor now approach the entrance from the southeast and at a point north of the entrance tack to a southwesterly course. The new entrance will require another tack to the northwest, but the maneuvers will be made in calm water instead of rough water as at present. No tacking in exposed water will be necessary until the boat is far beyond the hazards of shallow water and rock dikes.

Navigation Lights

The present flashing red light at the harbor entrance will be moved to the north end of the timber breakwater. The advice of the Coast Guard, Navigation Aids Section, has been requested to assist in determining the precise types and locations of other navigation lights. These decisions will not affect the layout of the entrance or the financial feasibility of the project.

Administration

The present administration office is too small and is poorly located for supervision of the expanded harbor. The Harbormaster must have a view of the entire basin, and the office should be convenient to visitors seeking information and persons wishing to arrange for berths or to pay rent. The plan locates administration on the east side of the harbor in a 3,600 square foot concrete block building with a 300 square foot control tower. The harbor maintenance shop and space for a small fire truck would be in the same building. Visitors' parking is located south of the building. Temporary visitors' berths and patrol boat and fireboat berths are nearby. (The fire station at 8th and Cedar Streets, five minutes away, will continue to serve the harbor.) An enclosed yard will be used for maintenance equipment. The administration building should be built at the same time as the new berths.

Restrooms

The plan provides new public restrooms on an existing pier on the west side of the harbor, in the bait and tackle building on the south side, at a midpoint on the east side, in the cafe building on the north side, and in the U.C. Yacht Club building in the launching and repair area.

Bait and Tackle

A new 5,400 square foot wood frame building housing a bait and tackle shop, a party boat reservation office, a small cannery, and public restrooms is proposed on the south side of the harbor. The location is convenient both to the large slips used by the party boats and to the fishing pier. Although it is in cramped and obsolete quarters, the present bait shop is well patronized.

Chandlery

The expanded harbor will provide ample market to support a chandlery carrying a full line of marine equipment and including a sail loft. Limited grocery and liquor sales also might be included. The proposed site on the north side of the harbor will accommodate a 6,400 square foot concrete block building.

Boat Sales

The plan proposes an 11,000 square foot display room and a 13,000 square foot display yard on the north side of the harbor between the repair shed and the chandlery. Berthing for use of the brokerage will be just south of the building.

Cafe

A 96 seat cafe or coffee shop on the north side of the basin will offer all patrons a view of the harbor.

Snack Bar

A 32 seat indoor-outdoor snack bar is located at the southeast corner of the harbor where it will attract business from party boat and fishing pier users, as well as from boat owners and Sunday drivers. The structure would be built on new decking over the existing boat house piling and would replace the present obsolete eight seat cafe.

Restaurants

At the northeast corner of the harbor a restaurant with a sweeping harbor and San Francisco view is proposed. The restaurant would extend over the water on piling and would have a 9,000 square foot dining room seating 300 and 6,000 square feet of banquet or meeting room space accommodating up to 600 persons. It would be possible to anchor a float below the building with water-level seating for cocktail lounge patrons.

A restaurant row overlooking the Bay on the west and the harbor to the east is located south of the Yacht Club on a 360 foot wide peninsula to be created by constructing a new dike west of the present one. Space would be available for up to 48,000 square feet of ground floor area - enough for a restaurant complex larger than Oakland's Jack London Square, and including a meeting room-ballroom which should be a popular locale for University dances.

Motels

One hundred twenty motel units in two separate two-story buildings are proposed northeast of the harbor. All units would have harbor and Bay views. A covered walkway would connect the motel with the nearby restaurant.

Service Stations

An automobile service station is combined with the fuel dock at the southeast corner of the harbor. A second service station at the extreme northeast corner of the project area would be well located to take care of trailer-borne boats. However, there probably will not be sufficient market to support two automobile service stations until other parts of the waterfront are developed.

Berkeley Yacht Club

The Berkeley Yacht Club, a private organization, leases a 3,000 square foot building at the harbor entrance. The structure, dating from 1937 with an addition built in 1956, is the only existing building proposed to remain. The Club has requested provision of a building of 4,000 to 5,000 square feet, parking for 100 cars, and 50 berths. The plan shows a 3,900 square foot addition to the building, a sheltered terrace, and ample parking area. Consideration was given to moving the Yacht Club in order to devote the entire entrance vantage point to restaurants and public observation areas. However, lack of an alternate site for separate private facilities and the value of the existing improvements weighed against relocation. A public observation plaza is provided at the harbor entrance west of the Yacht Club.

University of California Yacht Club

The plan provides a site in the launching area for a club house and work area for the University of California Yacht Club, a student organization founded in 1948. University classes in sailing also could use these facilities.

Vehicular Circulation

Main access to the marina will continue to be from University Avenue, although both Virginia and Cedar Streets could be improved to connect the harbor to the Eastshore Freeway frontage road. Construction of a second freeway between the harbor and the Eastshore Freeway is expected within 10-15 years. The proposed freeway is shown on the Berkeley and Alameda County Master Plans and on the California Freeway Plan. University Avenue will interchange with the new Shoreline Freeway; and Cedar Street could be connected with it, or with Cedar Street east of Eastshore Freeway by means of two grade separation structures. University Avenue alone would be adequate to serve the marina, but other waterfront development may require additional traffic capacity.

Within the marina, the following standard road widths are proposed: two-way roads, 34 feet, allowing two 12 foot moving lanes with one 10 foot parking or loading lane; one-way roads, 28 feet, allowing an 18 foot moving lane, wide enough to permit traffic to pass cars temporarily stopped, and a 10 foot parking or loading lane.

The launching area is reached from Cedar Street, north of the dry storage area. A one-way circulation system brings cars down the west side of the parking lot. Ramp-destined traffic branches off, using the northerly of two east-bound roads. Hoist-bound traffic uses the southerly road. After craft are launched and moored at storage floats, cars towing empty trailers proceed to the car-trailer parking lot. The parking layout provides for one-way circulation and drive-through, angle parking, minimizing difficult turning maneuvers. On the north side of the harbor, a road encircling the chandlery and boat sales area provides a loading lane for tenants of adjoining berths.

Part of the two-way road bordering the east side of the harbor is on land owned by the Pacific Guano Company. A road easement granted to the City expires in 1973. Because this street is essential both to the marina and to permit development of adjoining private land, dedication of the right of way by Pacific Guano and improvement by the City would be an equitable arrangement.

On the south side of the harbor a one-way loop street serves the fishing pier and parking areas. A branch extends north from this loop to the Yacht Club and provides a fine view of the harbor and the Bay for those enjoying a scenic drive around the marina.

In order to preserve views and to avoid blocking traffic, and because parking in lots is safer, more sightly and less expensive, no on-street parking will be permitted except on the east side of the harbor where sufficient off-street space is not available. However, berth tenants must be able to unload heavy gear near their boats; so loading zones should be designated on roads bordering the basin. On the east side of the harbor, loading areas will be provided at the end of each main float between parking bays.

Parking

The cost of spaces for berth tenants, ramp and hoist users, concession patrons, and club members should be included in the cost of providing the basic facility or service. If desired, meters or attendants could collect parking fees from visitors in the lots on the south side of the harbor. Parking is allocated as follows:

Berths:		
North side:	1.5 spaces per berth	407
East side:	1 space per berth	
	parking bays	71
	on-street	50
	northeast lot	9
	0.5 space per berth in southeast lot	65
South side:	1.5 spaces per berth	306
Launching:		250
Dry storage:	0.5 space per boat	100
Administration:		10

Bait and tackle:	Included in south side visitor parking	
Chandlery:	1 space per 150 square feet of floor area	42
Boat sales:		14
Cafe:	1 space per 3 seats	32
Snack bar:	Short-term curb parking; remainder included in south side lot.	
Restaurants:		
Northeast:	1 space per 3 seats plus 1 space per 5 meeting room seats	220
Restaurant row:	West lots; remainder included in south lot	216
Motels:	1 space per unit	120
Yacht Club:		100
Visitors:		
North side:		164
South side:		205
TOTAL		2,381

As restaurant row develops, additional land on the south side will have to be reclaimed for parking.

Pedestrian Circulation

The north and east sides of the harbor are bordered by a pedestrian walk, partly paved, and partly boardwalk. The existing docks provide pedestrian circulation on the south and west sides. A walk along the new west dike will connect the plaza at the harbor entrance with a small landscaped park and picnic area at the new entrance to the fishing pier.

Utilities

Power and Gas

An existing 12 kilovolt overhead line supplies electric power to the south side of the harbor. A temporary branch line on the east side provides power to the pumping station in the north diked area. Telephone lines to the harbor buildings are carried on the power poles. At present there is no natural gas line to the harbor area. Bottled gas currently is available.

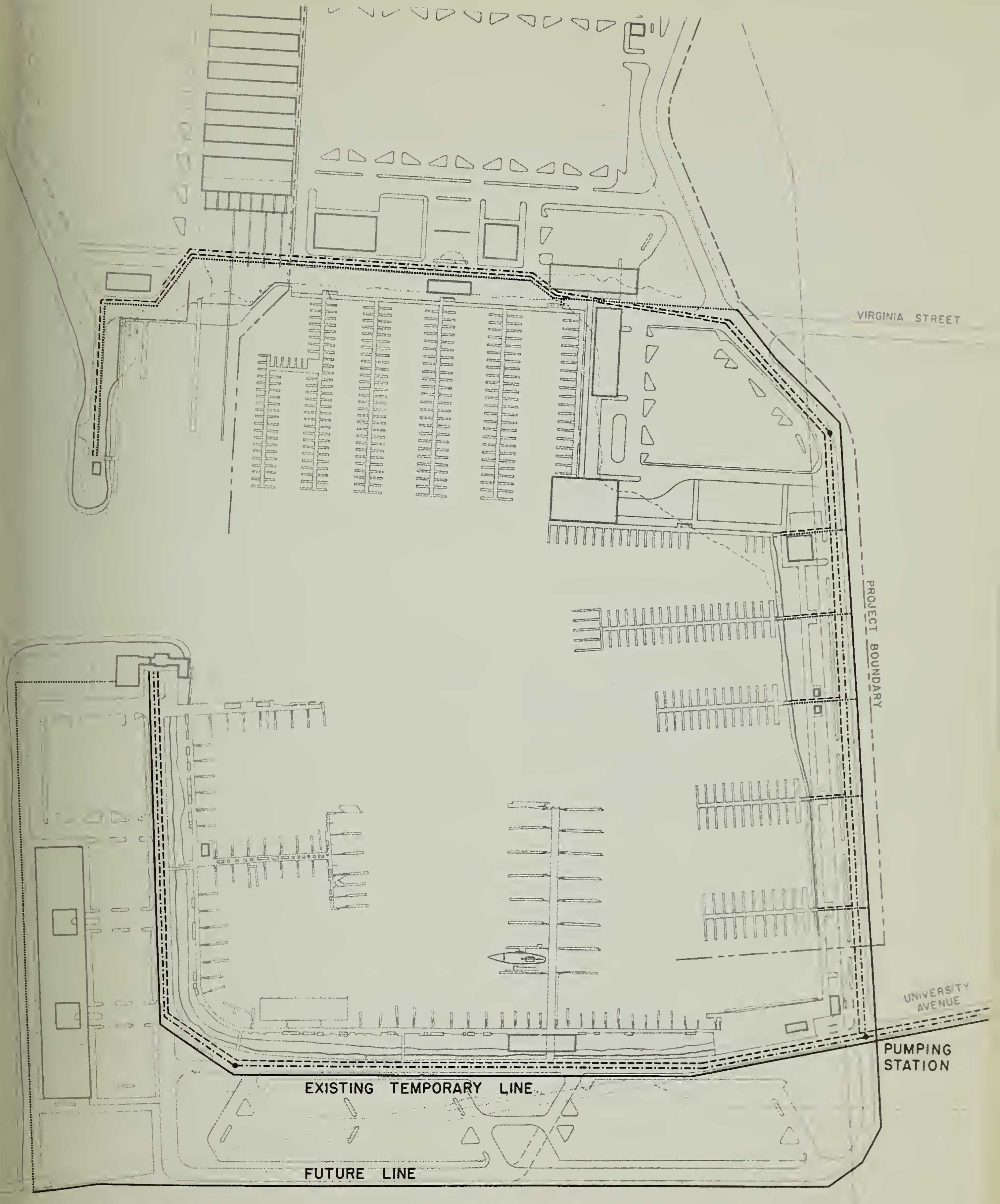
On the basis of information obtained from the utilities companies, it is assumed that overhead power will be supplied at no cost to the project. In those portions where underground power lines are to be used, the companies will require that the installation be made to their specifications. The excess cost of the underground lines over that of equivalent overhead lines must be borne by the project. Costs of necessary minor relocations of existing overhead power lines also will be charged to the project.

Gas line extension to the harbor area will be made from an existing line east of the freeway. The utility company will pay part or all of the cost, depending on the extent of demand. It is a reasonable assumption, subject to possible later amendment, that the company will bear the entire cost of the gas line.

Water

An existing three inch water line along University Avenue serves the harbor area. This line will be replaced by an eight inch line terminating near the existing repair building. The cost of this new line is being shared jointly by the City and the utility company, with the City paying the equivalent cost of a six inch line and the utility company absorbing the additional cost to provide an eight inch line. East Bay Municipal Utility District will extend the water main within the project. The cost will be borne by the project. Main lines will be six inches, or larger at the utility district's discretion, but only the cost of a six inch line will be assigned to the project.

At present, fire protection is provided by chemical extinguishers supplemented by dry standpipes at a few locations on the main piers. When connected to a pump, these standpipes draw water from the harbor. When the marina is developed, fire hydrants will be installed in locations to be determined by the City Fire Chief. The cost of installation will be borne by the project.



UTILITIES

—— OVERHEAD POWER
┈┈ UNDERGROUND POWER
- - - - WATER
-·-·-· SEWER AND GAS
• LIFT STATION

Sewers

Currently, storm water is not collected, but merely runs by gravity flow into the adjacent water areas. The development plan provides a limited surface collection system, and the cost is included in the street and paving costs.

Sanitary sewage now is discharged directly into the Bay. Rest rooms at the foot of the fishing pier discharge sanitary sewage into a septic tank. The system proposed for the marina calls for collection of sewage by branch lines on the north and south sides of the harbor. These will be gravity flow lines of sufficient length to require lift stations at intermediate points in each line. The lines terminate in a pumping station near the existing repair building. From the pumping station, a force main will carry the sewage along University Avenue and through an existing box sewer under the freeway to an interceptor line east of the freeway. All costs for this installation will be borne by the project.

General Appearance and Landscaping

The first new buildings to be constructed will set the standard for subsequent development. Since they probably will be built by the City, there is an opportunity to establish high quality architectural design as the norm. A procedure for careful review of plans can ensure that private construction will conform with this standard. Particular attention should be given to the design of signs, benches, walks, rails, light standards, curbs, trash receptacles and the other small elements which, if well done, can create a uniquely attractive character and give unity to the entire marina.

The plan calls for generous landscaping. Trees will serve as windbreaks, and the small parks at the harbor entrance and at the fishing pier will give visual relief from the large paved areas, while providing quiet space for picnicking and viewing the activity of the harbor. Streets and parking lots are to be landscaped.

The marina's appearance will be of greatest importance in attracting and ensuring the successful operation of those concessions, such as restaurants and motels, that will depend on the patronage of non-boaters.

CONSTRUCTION COSTS

Full development of the Berkeley Marina as shown on the development plan will require substantial private investment as well as a State Division of Small Craft Harbors' loan and possibly other public financing. The first stage development shown on the drawing is to be financed by a State loan which must be self-liquidating. Subsequent development also is expected to be self-supporting or to return a surplus. Certain features of the plan were omitted from the State loan project because initially there may not be sufficient demand to support them, because of the desirability of private construction of certain facilities, or because of the need to reduce the initial capital cost. The cost of the State Small Craft Harbors' loan project is summarized below: Details are listed in the table on the following page.

Basin	$ 316,800
Berths	399,500
Site development	488,600
Buildings	282,100
	$1,487,000
Contingency: 10 per cent	149,000
	$1,636,000
Design fees, testing, supervision: 10 per cent	164,000
	$1,800,000

CONSTRUCTION COST ESTIMATE

Item	Description	Quantity	Unit	Unit Price	Extension	Subtotal
1.	BREAKWATER	400	LF	$150.00		$ 60,000
2.	SOUTH DIKE					58,800
	a. Fill	11,200	CY	1.50	$ 16,800	
	b. Slope protection (both sides)	600	LF	70.00	42,000	
3.	NORTH DIKE					48,000
	a. Fill	8,000	CY	1.50	12,000	
	b. Slope protection (Bay side)	400	LF	90.00	36,000	
4.	BASIN					150,000
	a. Excavation	120,000	CY	0.375		45,000
	b. Slope protection	3,000	LF	35.00		105,000
5.	BERTHS	103,500	SF	3.00		310,500
6.	BERTH UTILITIES					43,200
	a. Power lines	5,600	LF	2.50	14,000	
	b. Power outlets	400	Ea.	30.00	12,000	
	c. Water lines	5,600	LF	2.00	11,200	
	d. Hose bibs	400	Ea.	5.00	2,000	
	e. Flood lights	40	Ea.	100.00	4,000	
7.	LOCKERS	100	Ea.	50.00		5,000
8.	PILES	320	Ea.	100.00		32,000
9.	GANGWAYS	11	Ea.	800.00		8,800
10.	LAND					117,300
	a. Fill	89,600	CY	1.25	112,000	
	b. Finish grade	106,000	SY	0.05	5,300	
11.	UTILITY DISTRIBUTION SYSTEMS					110,900
	a. Overhead power	1,700	LF	No cost to project		
	b. Underground power	1,600	LF	9.00	14,400	

Item	Description	Quantity	Unit	Unit Price	Extension	Subtotal
	c. Flood lights	8	Ea.	$300.00	$ 2,400	$
	d. Street lights	12	Ea.	100.00	1,200	
	e. Water lines	2,800	LF	4.50	12,600	
	f. Fire hydrants	6	Ea.	500.00	3,000	
	g. Sewer gravity line	3,400	LF	5.50	18,700	
	h. Sewer force main	2,800	LF	12.00	33,600	
	i. Sewer lift station	1	Ea.		10,000	
	j. Sewer pumping station	1	Ea.		15,000	
	k. Gas mains	5,300	LF	No cost to project		
12.	ROADS					49,400
	a. Class "A"	116,200	SF	0.25	29,050	
	b. Class "B"	33,800	SF	0.20	6,760	
	c. Class "C"	30,600	SF	0.15	4,590	
	d. Curbs	9,000	LF	1.00	9,000	
13.	PARKING					94,600
	a. Class "B"	219,500	SF	0.20	43,900	
	b. Class "C"	280,000	SF	0.15	42,000	
	c. Curbs	5,100	LF	1.00	5,100	
	d. Header boards	7,200	LF	0.50	3,600	
14.	WALKS					79,400
	a. Boardwalks	16,100	SF	3.00	48,300	
	b. Sidewalks	54,000	SF	0.55	29,700	
	c. Header boards	2,800	LF	0.50	1,400	
15.	LANDSCAPING					37,000
	a. Grass	80,000	SF	0.29	23,200	
	b. Ground cover	55,000	SF	0.14	7,700	
	c. Trees	500	Ea.	10.00	5,000	
	d. Shrubs	500	LS		1,100	
16.	BUILDINGS					
	a. Administration 60 x 60 300 SF tower included	3,600	SF	17.00		66,300
	b. Rest rooms 2-20 x 20		SF	21.00		16,800
	c. Bait and tackle shop 40 x 135 Public restrooms included		SF	15.00		81,000
	d. Chandlery 80 x 80	6,400	SF	10.00		64,000

Item	Description	Quantity	Unit	Unit Price	Extension	Subtotal
e.	Boat sales*	11,200	SF			
f.	Cafe 30 x 100	3,000	SF	$ 18.00		$ 54,000
	Public restrooms included					
g.	Restaurant*	15,000	SF			
h.	Motel*	48,000	SF			
	*Building to be constructed by concessionaire.					
						$1,487,000
17.	CONTINGENCY, 10%					149,000
						$1,636,000
18.	DESIGN FEES, TESTING, SUPERVISION, 10%					164,000
	TOTAL CONSTRUCTION COST					$1,800,000

LF = lineal foot; CY = cubic yard; SF = square foot; SY = square yard; LS = lump sum.

Breakwater, Dikes, Basin

Timber pile breakwater details are shown following page 23. A similar breakwater recently was constructed by the Corinthian Yacht Club in Belvedere Cove. Rehabilitation of the west side of the north dike will be as shown on the bay slope protection drawing on the same page. Protection for the basin side is included under bay slope protection costs. The surface construction necessary for the fuel dock is not included. The south dike is to be constructed with imported fill and protected on both sides as shown in the drawing, except that only one layer of armor rock is needed, rather than two as shown.

Independent soils investigations were conducted to determine the feasibility of the proposed construction. The soils consultants' report appears as Appendix 9. Locations of the borings are shown on the existing conditions photograph preceding page one. Material removed to provide adequate berthing depth in the north portion of the basin will be excavated by clamshell dredge and placed in the 250 foot by 1,000 foot area to the north that will be occupied by buildings. All of the north half of the basin will be dredged to -12 MLLW as shown on the development plan, even though portions are beyond the project boundary.

Except for the launching and repair area, the entire perimeter of the basin is to be protected as shown on the basin slope protection drawing. Costs for the north and east sections are listed in the construction cost estimate, and the south and west sections are included in the rehabilitation schedule.

Berthing

All berths are to be of treated douglas fir supported by polystyrene flotation. Piles also will be treated douglas fir, of 6 inch, 8 inch and 10 inch minimum tip diameter, and will be driven butt down. Gangways will be 6 feet wide and 32 feet long. Maximum slope during minus tides will be 16 per cent. Utilities will be of typical design for marine use. Lockers will be timber frame with plywood panel walls.

Land

Three types of fill are proposed. Existing land areas will receive an average of two feet of fill to reach a finish grade of approximately +12 MLLW. The 250 foot by 1,000 foot area on the north side of the harbor that is to be occupied by buildings will be filled and covered with five feet of sand. This area will be used for stockpiling sanitary cover material during construction, in order to speed settlement. The small, light structures proposed can be built immediately. The sanitary fill area will receive one and a half feet of fill in addition to the one and a half to two feet normally used as sanitary cover. This area is to be used only for parking, and will be overbuilt to allow for long-term settlement.

Detailed investigations to determine the total settlement and the length of the settlement period should be made prior to final design. All fill material not otherwise described will be hydraulically placed sand.

Utility Distribution Systems

Power will be provided by an overhead line from University Avenue to Virginia Street, with street lights on the poles. An underground line will extend west to the repair area and floodlights will be provided. No lighting is considered necessary in the large parking area to the north. Additional light for the northeast parking area will be provided as part of the restaurant-motel development.

Water lines with fire hydrants will extend along the same route from University Avenue to the repair area. All new buildings will have sewer connections. A gravity sewer line will parallel the water line with a lift station at the Virginia intersection. A line serving the new bait and tackle shop on the south side of the harbor is included. These lines will flow to a pumping station at the southeast corner of the harbor, and through a force main to an interceptor line east of the freeway on Second Street.

Roads and Parking

Three classes of pavement are proposed, all with 5 inches of untreated rock base. Class "A" will be two and one half inches of plant mix surfacing and will be used for the main road between University Avenue and Cedar Street. Because this route follows an existing dike built of select fill that has displaced the underlying mud, no settlement problems are anticipated. Class "B" pavement will be one and a half inches of plant mix and will be used for parking areas on existing fill, and on the area with five feet of sand cover. Major settlement of these areas will have occurred prior to paving. Class "C" will be an armor coat and will be used for all paving on new sanitary fill. This pavement should be replaced in 10 years. In general, concrete curbs will be used with Class "A" and "B" roads, and redwood header boards with Class "B" parking and Class "C" pavement and walks.

A boardwalk 10 to 12 feet wide, designed for pedestrian loads only, extends from the administration building west to the repair area.

Buildings and Landscaping

The administration building is to be built of concrete block with a light steel frame for the control tower. Restrooms will be of concrete block with ceramic tile interiors. The chandlery will be of concrete block with concrete columns and wood trusses or beams. The cafe will be of wood post and beam construction with concrete block bearing walls and wood siding. The bait and tackle shop will have a wood frame, wood siding, and an asphalt shingle roof. All other buildings will have built-up roofing. All buildings will be of one hour fire-rated construction, and all will have paper batt insulation on exterior walls and roof. The cafe and administration building will have acoustical treatment.

The cost of ground cover shown on the development plan was computed as follows:

Grass:	Topsoil	$.12 square foot
	Lawn and fine grading	.04 square foot
	Sprinklers	.13 square foot
		$.29 square foot

Ground cover:	Topsoil	$.06 square foot
	Ground cover	.06 square foot
	Hose bibs	.02 square foot
		$.14 square foot

Costs of trees and shrubs are shown in the table.

Contingencies

A contingency of 10 per cent is added to the construction cost to allow for possible construction problems that cannot be foreseen. Costs are based on 1960 prices and labor rates, and no allowance is included for probable increases beyond 1961.

An additional 10 per cent of this total is allowed for architectural and engineering design, soil investigations, materials testing, and construction design and supervision.

OPERATING COSTS

Administration and Maintenance

Administration and maintenance costs (exclusive of rehabilitation and depreciation) are shown in the following table. Tripling of the number of berths is expected to increase the annual budget from $65, 000 (which includes some rehabilitation costs) in 1959-60 to $90, 000. Thus, operation of the larger marina will be substantially more efficient. Cost estimates are based on experience at other harbors, as well as at Berkeley.

All combustible material constructed with State funds must be insured. The proposed fire truck, new patrol boat, waterlines and fire hydrants will reduce present rates. Utilities charges include an allowance for the cost of water and electricity to be provided to new berths as part of the rental rate. Income from existing and new concessions not included in the State loan feasibility computation will produce additional operating funds.

ESTIMATED AVERAGE ANNUAL OPERATING COSTS
(Administration and Maintenance)

1. Personnel			$60, 000
Salaries:			
Harbormaster		$ 9, 000	
Assistant Harbormaster		7, 200	
Harbor attendants	(3 @ $5, 400)	16, 200	
Secretary		4, 800	
Maintenance men	(2 @ $6, 000)	12, 000	
Total salaries		$49, 200	
Additional costs*		10, 800	
2. Supplies			2, 500
3. Promotion			750
4. Utilities			5, 000
5. Insurance			6, 250
6. Equipment, Vehicles, and Boats**			3, 500
7. General Maintenance			12, 000
TOTAL			$90, 000

* Federal and State taxes, vacations, sick leave, retirement, insurance, etc.
** New harbor patrol boat to be purchased from revenues during third year.

Rehabilitation

The costs of rehabilitating the existing berths and basin, as tabulated below, total $210,000. If this amount were included in the State loan, the minimum annual amortization (20 years at 4 per cent) would be $15,450, and the total cost would be $309,000. The rental rate would have to be raised to $.75 per lineal foot, the same as is to be charged for new berths. It is questionable whether boaters would be willing to pay this rate. However, the present facilities cannot possibly serve during the next 20 years without rehabilitation. It is proposed that rehabilitation be financed from revenue during a six year period beginning with the second year of expanded marina operation.

ESTIMATED COST OF REHABILITATING EXISTING BERTHING FACILITIES

Completion of float replacement program		$ 25,000*
Replacement of piles, caps, and stringers as necessary		45,000*
Replacement of deck	35,000 square feet @ $ 1.00	35,000
Slope protection	2,000 lineal feet @ $40.00	80,000
Excavation	50,000 cubic yards @ $ 0.50	25,000
TOTAL		$210,000

*Based on Harbormaster's estimate.

Depreciation

In order to guarantee the estimate of income necessary to repay the State loan, an amount must be set aside for replacement of facilities that have a life shorter than the 20 year loan period. These items include berths, berth utilities, lockers, and pavement on sanitary fill. All new berths will have to be replaced at the end of 15 years. Likewise, old berths must be replaced 15 years after installation. To simplify the depreciation schedule, this date was assumed to be 15 years after new berth construction in all cases.

All armor coat pavement on sanitary fill is to be replaced after 10 years, and upgraded to Class "A" for roads and Class "B" for parking. Curbs and headers are included and no salvage is assumed.

Because the depreciation fund must be set aside, it is assumed that it will be invested at 4 per cent. No depreciation allocation is proposed during the first year of expanded operation.

DEPRECIATION SCHEDULE

(Based upon a 4 per cent sinking fund beginning during the second year)

	Construction Cost	Sinking Fund Factor	Annual Cost
15-YEAR SERVICE LIFE			
New Facilities (See CONSTRUCTION COST ESTIMATE)			
Berths	$310,500		
Utilities on berths	43,200		
Lockers	5,000		
Existing Floats: 17,000 square feet @ $3.00 =	51,000		
	$409,700	x 0.05467	= $22,400
10-YEAR SERVICE LIFE			
Roads 30,600 square feet @ $0.25 =	7,650		
Parking 280,000 square feet @ $0.20 =	56,000		
Curbs 1,100 lineal feet @ $1.00 =	1,100		
Headerboards 3,800 lineal feet @ $0.50 =	1,900		
	$ 66,650	x 0.09449	= $ 6,300
ANNUAL COST SECOND THROUGH TENTH YEAR			= $28,700
ANNUAL COST ELEVENTH THROUGH FIFTEENTH YEAR			= $22,400

REVENUES

Revenue estimates used in the feasibility computations are listed in the table on the following page. In addition to berth and locker revenues, income from three concessions to be built by the City (bait and tackle shop, chandlery, and cafe) and three to be built by concessionaires (boat sales, northeast restaurant, and motel) is included. The present repair shed, fuel dock and cafe would remain in operating during first stage construction, but income from these leases is not included in the revenue estimates. The present launching ramp is assumed to remain available without charge until new facilities are built in the northwest area.

Following are the assumptions used in computing revenue estimates:

Existing berths: The flat rate now charged for each berth averages $.62 per lineal foot per month. No increase is assumed. 8,500 lineal feet x $0.62 x 90 per cent occupancy x 12 months = $56,900.

Existing lockers: Revenue is assumed to continue at the present rate of $3,500 per year.

New berths: Rent will be $.75 per lineal foot including normal use of water and power. 12,900 lineal feet x $0.75 x 90 per cent occupancy x 12 months = $104,500. Eighty per cent of this volume is assumed during the first year, 95 per cent during the second year, and 100 per cent during the third year.

New lockers: Large lockers will rent for $3.00 per month. One-fourth of the new berth renters are assumed to want large lockers. 100 lockers x $3.00 x 90 per cent occupancy x 12 months = $3,200. Occupancy during the first two years is expected to be the same as for new berths.

Bait and tackle shop, cannery and party boat reservations: The present bait and tackle concession paid the City 5 per cent on a gross volume of $90,000 in 1959. Tripling of the berthing capacity and provision of adequate sales quarters is expected to raise sales to $200,000 by the third year of operation. First and second year revenues are expected to be 60 and 80 per cent of this figure. The Harbormaster reports that in 1959 party boats carried 22,000 persons at an average fee of $8.00. It is believed that the City can collect 5 per cent of this revenue, which is assumed to remain constant. The annual return to the City on its construction investment would be about 17 per cent excluding the value of the land.

ESTIMATED ANNUAL REVENUES

Facility	Operating Year				
	First	Second	Third	Fourth	Fifth and Thereafter
Existing Berths	$ 56,900	$ 56,900	$ 56,900	$ 56,900	$ 56,900
Existing Lockers	3,500	3,500	3,500	3,500	3,500
Subtotal	$ 60,400	$ 60,400	$ 60,400	$ 60,400	$ 60,400
New Construction					
Berths	83,600	99,275	104,500	104,500	104,500
Lockers	2,440	3,040	3,200	3,200	3,200
Bait and tackle	14,700	16,800	18,800	18,800	18,800
Chandlery	10,500	13,500	15,000	15,000	15,000
Sales		12,500	18,700	25,000	25,000
Cafe	4,860	6,885	8,100	8,100	8,100
Restaurant		16,300	24,400	32,500	32,500
Motel (1st unit)		11,200	13,400	14,900	14,900
Motel (2nd unit)			11,200	13,400	14,900
TOTALS	$176,500	$239,900	$277,700	$295,800	$297,300

Chandlery: Based on interviews with businessmen in the field the annual sales estimate is $300,000. The first year of operation is expected to yield 70 per cent of this total and the second year 90 per cent. The City would receive 5 per cent of the gross. Average annual sales in a 6,400 square foot building would be $47 per square foot, an acceptable figure. The return to the City on the improvements cost would be approximately 17 per cent. No land value is included in this figure.

Cafe: Annual gross is estimated at $90,000 for the third and succeeding years. First year volume is assumed at 60 per cent and the second year at 85 per cent. The estimate assumes 96 seats, a turnover rate of 3, an average expenditure of $1 per customer, and a 6 day week. This conservative estimate would yield annual sales of $27 per square foot for a 2,400 square foot building. The lease should give the City 9 per cent of gross sales, a common percentage for restaurants of this type. The coffee shop at Tilden Golf Course pays 10 per cent of the gross. The City would provide the building and would receive a return of approximately 10 per cent on its investment, excluding land value.

Boat sales: Thrall-Hurst, Inc. Yacht Sales at the Oakland Marina grossed $650,000 in 1959. Berkeley Marina boat sales are assumed to reach $500,000 in the fourth year. The volume is expected to build from nothing during the first year after berth expansion to 50 per cent in the second year and 75 per cent of the assumed level in the third year. Revenue to the City would be 5 per cent, the same as is paid by Thrall-Hurst. The building would be built by the lessee.

Northeast restaurant: Restaurant sales volume is particularly difficult to forecast because it will depend primarily on the competence of management rather than on serving a ready-and-waiting market. The following assumptions are used:

Evening:	300 seats (capacity) x 1.5 turnover x $2.50 per person x 6 day operation	= $352,000
Lunch:	300 seats x 1.0 turnover x $1.50 per person x 6 day operation	= 140,000
Bar:	One half of customers x $.50 x 6 day operation	= 58,000
Banquet Rooms (600 persons capacity):		
Dinner:	200 persons x 1.5 times per week x $4.00 per person (includes liquor)	= 62,400
Lunch:	100 persons x 3 times per week x $2.40 per person (includes liquor)	= 37,600
		$650,000

The restaurant is assumed to be open during the second year after berth expansion and to reach 50 per cent of its projected volume that year, 75 per cent the third year and 100 per cent the fourth year. The building would be built by the concessionaire. It is suggested that the ground lease prescribe payment of 5 per cent of gross sales to the City. Parking area would be provided by the City.

At $40 per square foot, the minimum annual volume for successful operation according to the Urban Land Institute, the 15,000 square foot restaurant should gross $600,000. Tarantino's on Fisherman's Wharf in San Francisco grosses about $780,000 per year, and the phenomenally successful Spenger's restaurant in Berkeley is reported to gross $2 million annually.

Data published in Sales Management's Survey of Buying Power indicates a market for new restaurants in Berkeley. In 1959, Berkeley per capita eating and drinking expenditures were only two-thirds of the California average, while Berkeley per capita income was estimated to be 20 per cent higher. Restrictions on liquor sales near the University undoubtedly account for much of the difference. A restaurant at the marina would be free of such limitations.

Motels: The plan provides for two 60 unit motel buildings to be operated either separately or as a single enterprise. When the motels are fully established, the occupancy is expected to be 85 per cent (average for the industry) and the average daily room rental $10.00. The first 60 units are assumed to be open during the second year after new berth construction and to reach 75 per cent of the ultimate volume that year, 90 per cent the next year, and 100 per cent ($186,000) during the third year of operation. The second 60 units are assumed to begin operation in the fourth year after berth expansion and to follow the same pattern of business build-up. Because of the large amount of land area required for buildings and parking in relation to the gross income, 8 per cent of gross volume would be a reasonable ground lease rate.

Interviews with Mr. Edward Martin, President of Bayshore Construction Company of Oakland, developer of large motels in Fresno and Sacramento, and Mr. Clifford Knudsen of the Holiday Inn in Sacramento and the Tally Ho's of Reno and Tahoe, revealed great enthusiasm for the Berkeley waterfront as a motel site. Mr. Martin believes that 250-300 units might even be constructed in the first increment. Although Berkeley's location and role in the metropolitan area make it difficult to determine the market for hotel-motel rooms, it appears that additional facilities are warranted. The American Automobile Association guide lists 1,075 approved units in Berkeley. This is one per 1,000 population, less than half the average ratio for Oakland, San Diego, Fresno and Sacramento.

Only very rough revenue estimates were made for concessions shown on the plan but not included in the State loan feasibility study. At the time that two additional restaurants and all of the repair, storage, launching, and fuel dock concessions are in full operation, it appears that about $80,000 additional annual income can be expected.

REVENUE / COST ANALYSIS FOR PERIOD OF LOAN

	Operating Year					
	1	2	3	4	5	6
Operating costs	$ 90,000	$ 90,000	$110,000[(a)]	$ 90,000	$ 90,000	$ 90,000
Rehabilitation		35,000	35,000	35,000	35,000	35,000
Depreciation		28,700	28,700	28,700	28,700	28,700
Interest only	72,000	72,000	72,000			
Amortization (interest and principal)				148,000	148,000	148,000
TOTAL COST	$162,000	$225,700	$245,700	$301,700	$301,700	$301,700
TOTAL INCOME	$176,500	$239,900	$277,700	$295,800	$297,300	$297,300
SURPLUS OR DEFICIT	14,500	14,200	32,000	(-5,900)	(-4,400)	(-4,400)
CUMULATIVE SURPLUS	14,500	28,700	60,700	54,800	50,400	46,000

TOTAL PROJECT REVENUE / COST RATIO $= \frac{\$5,746,700}{\$5,132,300} = 1.12$

(a) Includes $20,000 for harbor patrol boat.
(b) Cumulative surplus at end of 15th year.
(c) Cumulative surplus at end of 20th year.

Operating Year						Project Total
7	8	9	10	11-15	16-20	
$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000 x 5	$ 90,000 x 5	$1,820,000
35,000						$ 210,000
28,700	28,700	28,700	28,700	22,400 x 5		$ 370,300
						$ 216,000
148,000	148,000	148,000	148,000	148,000 x 5	148,000 x 5	$2,516,000
$301,700	$266,700	$266,700	$266,700	$260,400 x 5	$238,000 x 5	$5,132,300
$297,300	$297,300	$297,300	$297,300	$297,300 x 5	$297,300 x 5	$5,746,700
(-4,400)	30,600	30,600	30,600	36,900 x 5	59,300 x 5	
41,600	72,700	102,800	133,400	317,900(b)	614,400(c)	

State Small Craft Harbor Loan Project

Estimated income and costs during the 20 year period of the proposed loan by the State Division of Small Craft Harbors are listed in the table on page 54. To ensure a surplus for each year's operation, it is necessary to postpone repayment of principal until the fourth year. State regulations allow postponement until the fifth year. Interest for the first three years is $72,000 ($1,800,000 x 4 per cent). Repayment would be over a 17 year period. Rehabilitation of existing facilities could be completed within four years instead of seven, as shown, by deferring principal payments another year. However, this would increase total costs by $28,000 and would lower the revenue-cost ratio.

In order to obtain a loan from the Division of Small Craft Harbors, the ratio of revenue to cost must be at least 1.10 : 1.00. The project as presented has a revenue-cost ratio of 1.12 : 1.00. It should be remembered that this ratio is based on conservative revenue estimates, and does not include revenues from existing concessions that will remain temporarily or from many of the new concessions shown on the plan and expected to begin operation during the life of the loan.

Additional Development

The elements of the plan not included in the State loan project were eliminated to reduce the amount of the State loan. All except the completion of the restaurant row and the second service station could expect ample trade during the early years after harbor expansion.

Reclamation of land south and west of the harbor as shown on the plan will prove very expensive unless accomplished over a long period of time as select fill becomes available or unless a large scale hydraulic fill project is undertaken on the waterfront.

Several considerations lead to the recommendation that a ground lease for the launching, repair, storage and fueling concessions be granted to one or more experienced private operators. Investment in these facilities must keep in step with demand. The rate of development will depend in large part on the financial capacity and managerial ability of the operators and the particular aspects of the business they wish to emphasize. Ultimate investment is estimated to range between three-quarters and one million dollars, and gross annual income will be on the order of $200,000.

APPENDIX 1: POPULATION IN THE 12 MARKET-AREA COMMUNITIES, 1930-1960

	1930	1940	1950	1960
Market Area Population	445,406	484,275	737,353	690,812
Alameda	35,033	36,256	64,430	53,606
Albany	8,569	11,493	17,590	14,749
Berkeley	82,109	85,547	113,805	108,539
Emeryville	2,336	2,521	2,889	2,610
Oakland	284,063	302,163	384,575	361,082
Piedmont	9,333	9,866	10,132	10,973
El Cerrito	3,870	6,137	18,011	25,265
Kensington		3,350*	6,600*	7,000*
Moraga		300*	300*	1,500*
Orinda		3,000*	5,000*	15 000*
Richmond	20,093	23,642	99,545	71,050
San Pablo			14,476	19,438

* Based on estimates made by the Contra Costa County Development Association. Other data from U.S. Censuses of Population; 1960 are preliminary field counts.

APPENDIX 2: EFFECTIVE BUYING INCOME IN MARKET AREA COMMUNITIES: 1959

	Cash Income Per Household	Income Breakdown of Households									
		$0-2, 499		$2, 500-3, 999		$4, 000-6, 999		$7, 000-9, 999		$10, 000 & Over	
		Per Cent Households	Per Cent Income	Per Cent Households	Per Cent Income	Per Cent Households	Per Cent Income	Per Cent Households	Per Cent Income	Per Cent Households	Per Cent Income
Alameda	$6, 770	11.4	2.5	14.8	7.0	39.4	31.2	19.4	23.4	15.0	35.9
Albany	6, 774	11.6	2.6	14.4	6.8	39.2	30.9	19.9	24.1	14.9	35.6
Berkeley	7, 155	13.0	2.7	12.9	5.8	36.7	27.5	19.1	21.8	18.3	42.2
Oakland	6, 649	13.0	2.9	15.2	7.4	38.5	30.9	18.5	22.8	14.8	36.0
Piedmont	10, 316	7.9	1.2	12.4	3.9	25.4	13.1	17.8	14.1	36.5	67.7
El Cerrito	7, 062	12.9	2.8	13.9	6.3	36.8	27.9	19.2	22.2	17.2	40.8
Richmond	6, 302	11.6	2.8	15.8	8.1	42.1	35.7	18.8	24.4	11.7	29.0
San Pablo	6, 220	12.0	3.0	15.5	8.0	42.4	36.5	18.6	24.4	11.3	28.1

Source: Sales Management, July 10, 1960.

APPENDIX 3: LOCATIONS OF REGISTERED BOATS, OWNED BY MARKET-AREA RESIDENTS: JUNE 30, 1960

County in which Boat Kept	Number of Boats Owned				
	Total		Under 16'	16' & Over, Under 26'	26 and Over
	Per Cent	Number			
All boats owned by Alameda County market-area residents	100.0	6,118	3,998	1,671	449
Kept in Alameda County	76.5	4,681	3,341	1,098	242
Kept outside Alameda County	23.5	1,437	657	573	207
In Contra Costa County	11.3	689	184	344	161
In Eldorado County	1.1	69	47	21	1
In Lake County	3.2	194	143	51	
In Marin County	0.9	56	22	19	15
In Placer County	1.4	83	31	48	4
In Sacramento County	1.1	65	24	28	13
In San Joaquin County	1.0	60	42	15	3
In Solano County	0.8	52	33	17	2
In all others (28 counties)	2.7	169	131	30	8
All boats owned by Contra Costa County market-area residents	100.0	3,061	2,285	651	125
Kept in Contra Costa County	90.1	2,757	2,086	570	101
Kept outside Contra Costa County	9.9	304	199	81	24
In Alameda County	2.0	61	28	20	13
In El Dorado County	0.6	17	15	2	
In Lake County	2.6	79	60	19	
In Marin County	0.4	13	2	5	6
In Solano County	0.4	13	10	3	
In Placer County	0.4	11	6	4	1
In Sonoma County	0.3	10	9	1	
In Toulumne County	0.3	9	8	1	
In all others (14 counties)	3.0	91	61	26	4

Source: State of California, Small Craft Registration Files.

APPENDIX 4: NUMBER OF REGISTERED BOATS OWNED BY ALAMEDA AND CONTRA COSTA COUNTY RESIDENTS, BY SIZE OF BOAT, FOR COMMUNITIES IN THE BERKELEY HARBOR MARKET AREA: JUNE 30, 1960

Area	Number of Boats Owned						
	Total	Under 16'	16' & Over, Under 20'	20' & Over, Under 26'	26' & Over, Under 32'	32' & Over Under 40'	Over 40'
Alameda County Total	11,849	7,986	2,269	930	387	215	62
Not in Market Area	5,171	3,718	1,013	301	86	46	7
Address Unknown	560	270	123	91	36	28	12
Market Area Total	6,118	3,998	1,133	538	265	141	43
Alameda City	857	551	133	92	52	23	6
Albany	207	153	36	7	5	5	1
Berkeley	1,043	689	172	91	49	28	14
Emeryville	38	27	8			1	2
Oakland	3,750	2,469	726	316	149	75	15
Piedmont	223	109	58	32	10	9	5

Area	Number of Boats Owned						
	Total	Under 16'	16' & Over, Under 20'	20' & Over, Under 26'	26' & Over, Under 32'	32' & Over, Under 40'	Over 40'
Contra Costa County Total	9,931	7,105	1,841	593	260	108	24
Not in Market Area	6,467	4,593	1,251	396	155	58	14
Address Unknown	403	227	91	45	23	14	3
Market Area Total	3,061	2,285	499	152	82	36	7
El Cerrito	502	354	83	35	15	11	4
Kensington	44	25	8	5	5	1	
Moraga	16	11	2	2			1
Orinda	229	121	56	28	14	9	1
Richmond	1,539	1,170	252	61	41	14	1
San Pablo	731	604	98	21	7	1	

Source: State of California, Small Craft Registration Files.

NUMBER OF REGISTERED BOATS OWNED IN ALAMEDA AND CONTRA COSTA COUNTIES, BY SIZE OF BOAT: JUNE 30, 1960

Area	Number of Boats Owned						
	Total	Under 16'	16' & Over, Under 20'	20' & Over, Under 26'	26' & Over, Under 32'	32' & Over, Under 40'	Over 40'
Two-County Total	21,780	15,091	4,110	1,523	647	323	86
Market Area Total	9,179	6,283	1,632	690	347	177	50
Not in Market Area	11,638	8,311	2,264	697	241	104	21
Addresses Unknown	963	497	214	136	59	42	15

Source: State of California, Small Craft Registration Files.

APPENDIX 5: PERCENTAGE DISTRIBUTION OF REGISTERED BOATS OWNED BY ALAMEDA AND CONTRA COSTA COUNTY RESIDENTS, BY SIZE OF BOAT: JUNE 30, 1960

Area	Percentage of Boats Owned						
	Total	Under 16'	16' & Over, Under 20'	20' & Over, Under 26'	26' & Over, Under 32'	32' & Over, Under 40'	Over 40'
Two-County Total	100.0	69.2	18.9	7.0	3.0	1.5	0.4
Market Area Total	100.0	68.4	17.8	7.5	3.8	1.9	0.6
Not in Market Area	100.0	71.4	19.5	6.0	2.1	0.9	0.2
Addresses Unknown	100.0	51.6	22.2	14.1	6.1	4.4	1.6
Two-County Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Market Area Total	42.1	41.6	39.7	45.3	53.6	54.9	58.1
Not in Market Area	53.4	55.1	55.1	45.8	37.2	32.2	24.4
Address Unknown	4.4	3.3	5.2	8.9	9.0	13.0	17.4

Details may not add to totals, due to rounding.

Source: Derived from Appendix 4.

APPENDIX 6: Berkeley Yacht Harbor Market Study - 1960

Livingston and Blayney, John A. Blume and Associates

Questionnaire for Telephone Interview of Sample of Registered Boat Owners Residing in the Market Area as of June 1960

Name: ______________________ Address: ______________________

Phone No.: ______________________ Length of Boat (by Reg.): ______________

---

1. What kinds of facilities other than berths and launching ramps, do you think a harbor-marina ought to have? Motel-Boatel_____Repair Shop_____Grocery_____Boat and Motor Sales_____Restaurant-Cocktail Bar_____Bait and Tackle_____Boat Accessory_____ Gasoline, etc._____Others______________________________

____

2. What size of boat do you now own?______________________________

3. Is it a motor or a sail boat? Motor_____Sail_____(If sail), does it have Aux. power?_____

4. Where is your boat principally kept? In water_____On land_____Both_____

   a. If in Water:

   At which harbor? ______________________________

   Would you prefer to keep your boat at any other harbor? Yes_____No_____ (If yes), at which other harbor?______________________________

   Why? ______________________________

   ____

   *(If not "Berkeley") If berthing space were available at the B.Y.H., would you keep your boat there? Yes_____No_____Why? ______________________________

   ____

What rental do you now pay for berthing (Lin. Ft./Mth.)____________________

Would you be willing to pay a little more to be at the harbor of your choice? Yes_____

No_____How much more?_____________________________

b. If on Land:

Do you store your boat at home?_____or at a harbor?_____(If at a harbor), which harbor?______________________________________

How much do you pay for harbor storage (Lin. Ft./Mth.)____________________

(If at home) Where, in the "Bay" area, do you usually launch your boat? ____________

______________________________Do you prefer a hoist_____or a ramp_____?

Have you ever used the B.Y.H.? Yes_____No_____(If yes), did you find boating there satisfactory? Yes_____No_____Why?______________________________________

____

(If no), is there any special reason for not using it?____________________________

____

*If dry storage were available at the B.Y.H., would you store your boat there? Yes____

No_____Why?____

*If berthing space were available at the B.Y.H., would you berth your boat there?

Yes_____No_____Why?____

c. If Both:

Where do you keep your boat when it is in the water?__________________________

______________________________ How many months of the year do you keep it in *the water?_____ If berthing space were available at the B.Y.H., would you berth your boat there? Yes_____No_____Why?____

____

*If dry storage were available at the B.Y.H., would you store your boat there?

Yes_____No_____Why?____

5. Any other comments you would like to make about harbors?____________________

6. Any comments you would like to make about the B.Y.H.?____________________

*RATING SCALE FOR AFFIRMATIVE: Strong Yes is (1), Weak Yes is (2), and a Neutral-Maybe is (3).

APPENDIX 7: BOATS OVER 16 FEET IN LENGTH PRESENTLY BERTHED AT THE BERKELEY HARBOR: AUGUST 1960

	Total	16' & Over, Under 20'	20' & Over, Under 26'	26' & Over, Under 32'	32' & Over, Under 40'	Over 40'
ALL BOATS	204	15	30	46	49	64
Owner resides inside market area	173	13	27	43	41	49
Pleasure boats	136	13	27	41	27	28
Party boats	25			2	10	13
Commercial boats	12				4	8
Owner resides outside market area	31	2	3	3	8	15
Pleasure boats	23	2	3	2	7	9
Party boats	7			1	1	5
Commercial boats	1					1
DOCUMENTED BOATS	48				10	38
Owner resides inside market area	38				10	28
Pleasure boats	15				4	11

Party boats	16				4	12
Commercial boats	7				2	5
Owner resides outside market area	10					10
Pleasure boats	4					4
Party boats	5					5
Commercial boats	1					1
REGISTERED BOATS	156	15	30	46	39	26
Owner resides inside market area	135	13	27	43	31	21
Pleasure boats	121	13	27	41	23	17
Party boats	9			2	6	1
Commercial boats	5				2	3
Owner resides outside market area	21	2	3	3	8	5
Pleasure boats	19	2	3	2	7	5
Party boats	2			1	1	
Commercial boats						

Source: Files of the Harbormaster, Berkeley Harbor.

APPENDIX 8: NUMBER OF REGISTERED BOATS OWNED BY RESIDENTS OF THE 12 MARKET-AREA COMMUNITIES, PER 1,000 RESIDENTS: 1960

Community	1960 Population*	Number of Boats per 1,000 Population		
		Total	Under 16'	16' and Over
Market Area Total	690,812	13	9	4
Alameda	53,606	16	10	6
Albany	14,749	14	10	4
Berkeley	108,539	9	6	3
Emeryville	2,610	14	10	4
Oakland	361,082	10	7	3
Piedmont	10,973	20	10	10
El Cerrito	25,265	20	14	6
Kensington	7,000**	6	3	3
Moraga	1,500**	11	7	4
Orinda	15,000**	15	8	7
Richmond	71,050	20	16	4
San Pablo	19,438	37	31	6

* Except as noted, preliminary field counts of the 1960 Census of Population.

** Based on estimates made by the Contra Costa County Development Association.

Source: Boat data from Appendix 4.

APPENDIX 9:

DAMES & MOORE
CONSULTANTS IN APPLIED EARTH SCIENCES
SOIL MECHANICS · ENGINEERING GEOLOGY · GEOPHYSICS

340 MARKET STREET · SAN FRANCISCO 11, CALIFORNIA DOUGLAS 2-6507
PARTNERS: WILLIAM W MOORE · WILLIAM ENKEBOLL
ASSOCIATES: CHARLES L. NICHOLS · ROBERT D. DARRAGH

August 29, 1960

City of Berkeley
c/o John A. Blume & Associates, Engineers
612 Howard Street
San Francisco 5, California

Attention: Mr. Joseph P. Nicoletti

Gentlemen:

Consultation Regarding Feasibility Study
Small Craft Harbor
Berkeley, California
For the City of Berkeley

This letter and attachments present the results of consultation regarding proposed improvements to the Small Boat Harbor in Berkeley, California. The existing harbor lies at the foot of University Avenue in Berkeley, California. The harbor is presently protected by a rubble mound breakwater running north and south, roughly parallel to the shoreline. It is now proposed to improve the entrance to the harbor by extending the breakwater in a westerly direction some 300 feet. The breakwater will be extended by a wood pile bulkhead, running in a northwesterly direction and providing further protection to the harbor entrance. Present plans envision construction of the rubble breakwater to approximately Elevation 12 (Mean Lower Low Water Datum), and the use of driven piling to form the bulkhead.

The purpose of our consultation was to provide the following information for the use of your Engineers in their design studies for the breakwater and bulkhead:

1. The safe side slopes to which the rubble breakwater could be constructed.
2. The amount of settlement which the breakwater would undergo subsequent to construction.
3. The amount of lateral resistance which may be developed in the soils into which the piles for the bulkhead are driven.

To gain general information regarding the soil conditions at the location of the proposed structures, three borings were drilled at locations determined by Mr. Roger Skjei of John A. Blume & Associates. Information on the boring locations is retained in their files. The borings were drilled utilizing floating wash-boring equipment to depths ranging from 13 to 25 feet below the present bay bottom. One of our Engineers was present during drilling operations to log the soils encountered and obtain undisturbed core samples of these soils for visual examination and laboratory testing. The results of the borings are presented graphically on Plate 1. The nomenclature used in describing the soil types is defined on the Soil Classification Chart and Key to Test Data appearing on Plate 2.

Selected undisturbed core samples obtained during our field exploration were tested in direct double and triaxial shear in order to evaluate the properties of the soils. The shear tests were performed under both natural and increased surcharge pressures. The results of the tests are presented adjacent to the logs of borings in the manner described by the Key to Test Data appearing on Plate 2.

Our explorations revealed that the area in which the proposed structures will be placed has for a bottom a soft silty clay of very low strength. This silty clay is found in most sections of San Francisco Bay and is commonly referred to as "bay mud". At the points explored, the bay mud ranges in thickness from four to six feet. Beneath the mud, moderately firm sandy clays are encountered. This sandy clay stratum is probably 10 or 15 feet in thickness. A firm clay underlies the sandy clay to the maximum depth of our borings.

On the basis of our field explorations and laboratory testing, we believe that it would be possible to construct the dumped rubble breakwater so that the weak muds are completely displaced from beneath the fill. Under such conditions, the rubble wall can safely be constructed with side slopes of two on one (two feet horizontal to one foot vertical). A rubble fill placed to Elevation 12 would experience settlements of less than one-half foot following construction if all the mud were displaced. This settlement will occur primarily within the first year following construction.

We understand that at some future time the area to the west of the existing breakwater and south of the proposed rubble fill breakwater may be filled with dry material to form a parking lot. The area thus reclaimed from the bay would be approximately 300 by 500 feet in plan dimensions. Reclamation of such a large area by placing fill would probably result in some of the soft bay deposits being trapped beneath the fills. Under such conditions, differential settlements of as much as one foot could occur over small distances. Such settlements would result in additional maintenance costs but would not interfere with the use of the area as a parking lot.

On Plate 3, we have presented the available lateral resistances which may be used in design of the pile bulkhead. These values are based upon the properties of the soils at the proposed locations of the bulkhead, and include what we believe is an adequate factor of safety.

The following Plates are attached and complete this report:

Plate 1 - Log of Borings (Borings 1, 2, and 3)

Plate 2 - Soil Classification Chart and Key to Test Data

Plate 3 - Lateral Pile Resistance

Yours very truly,

DAMES & MOORE

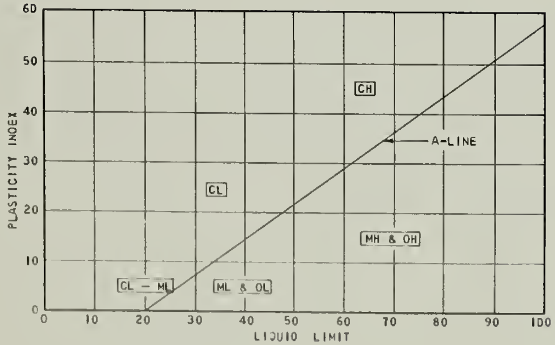
Robert D Darragh
Robert D. Darragh

RDD-DFJ AT
(3 Copies Submitted)
Attachments

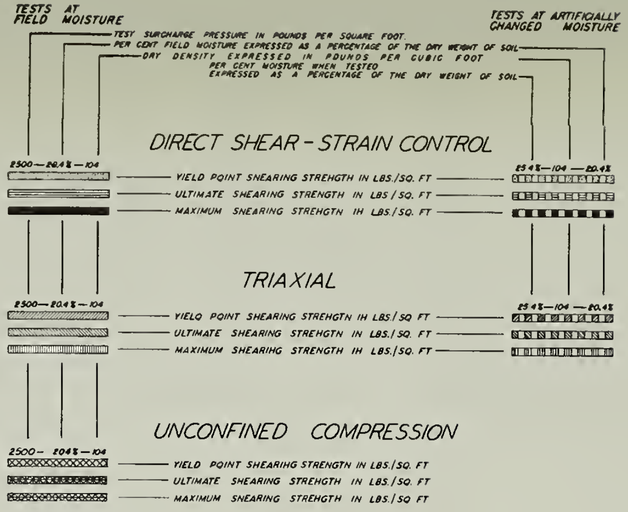
MAJOR DIVISIONS					LETTER	SYMBOL	DESCRIPTION
COARSE-GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE.	THE NO. 200 SIEVE SIZE IS ABOUT THE SMALLEST PARTICLE VISIBLE TO THE NAKED EYE.	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE.	(FOR VISUAL CLASSIFICATION, THE 1/4" SIZE MAY BE USED AS EQUIVALENT TO THE NO. 4 SIEVE SIZE)	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	▨	WELL-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
					GP	▨	POORLY-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	▨	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
					GC	▨	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
		SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE.		CLEAN SANDS (LITTLE OR NO FINES)	SW	▨	WELL-GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
					SP	▨	POORLY-GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
				SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	▨	SILTY SANDS, SAND-SILT MIXTURES
					SC	▨	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE-GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE.		SILTS AND CLAYS LL < 50			ML	▨	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
					CL	▨	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
					OL	▨	ORGANIC SILTS AND ORGANIC SILT-CLAYS OF LOW PLASTICITY
		SILTS AND CLAYS LL > 50			MH	▨	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
					CH	▨	INORGANIC CLAYS OF HIGH PLASTICITY FAT CLAYS
					OH	▨	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS					Pt	▨	PEAT AND OTHER HIGHLY ORGANIC SOILS

SOIL CLASSIFICATION CHART

UNIFIED SOIL CLASSIFICATION SYSTEM



PLASTICITY CHART


TESTS AT FIELD MOISTURE
TESTS AT ARTIFICIALLY CHANGED MOISTURE
TEST SURCHARGE PRESSURE IN POUNDS PER SQUARE FOOT.
PER CENT FIELD MOISTURE EXPRESSED AS A PERCENTAGE OF THE DRY WEIGHT OF SOIL
DRY DENSITY EXPRESSED IN POUNDS PER CUBIC FOOT
PER CENT MOISTURE WHEN TESTED EXPRESSED AS A PERCENTAGE OF THE DRY WEIGHT OF SOIL
DIRECT SHEAR - STRAIN CONTROL
2500—20.4%—104
25.4%—104—20.4%
YIELD POINT SHEARING STRENGTH IN LBS./SQ. FT
ULTIMATE SHEARING STRENGTH IN LBS/SQ. FT
MAXIMUM SHEARING STRENGTH IN LBS./SQ. FT
TRIAXIAL
2500—20.4%—104
25.4%—104—20.4%
YIELD POINT SHEARING STRENGTH IN LBS./SQ FT
ULTIMATE SHEARING STRENGTH IN LBS./SQ. FT
MAXIMUM SHEARING STRENGTH IN LBS./SQ. FT
UNCONFINED COMPRESSION
2500— 20.4%—104
YIELD POINT SHEARING STRENGTH IN LBS./SQ. FT
ULTIMATE SHEARING STRENGTH IN LBS./SQ. FT
MAXIMUM SHEARING STRENGTH IN LBS./SQ FT

KEY TO TEST DATA

■ INDICATES DEPTH OF UNDISTURBED SAMPLE

☒ INDICATES DEPTH OF DISTURBED SAMPLE

☐ INDICATES DEPTH OF SAMPLING ATTEMPT WITH NO RECOVERY

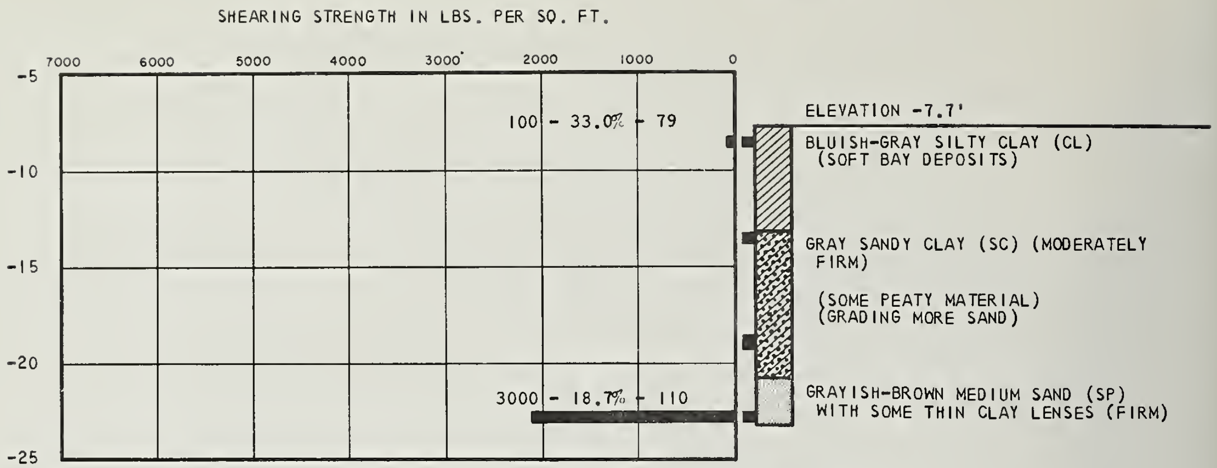
◩ INDICATES DEPTH OF SPLIT-SPOON SAMPLE

▯ INDICATES DEPTH AND LENGTH OF CORING RUN

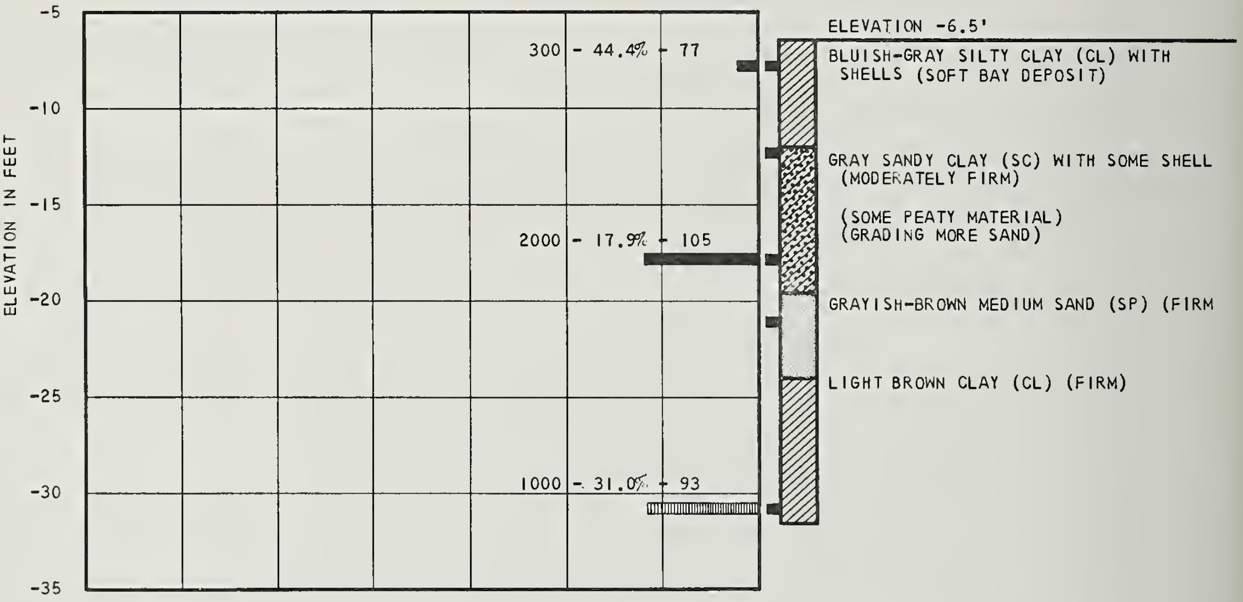
KEY TO SAMPLES

DAMES & MOORE

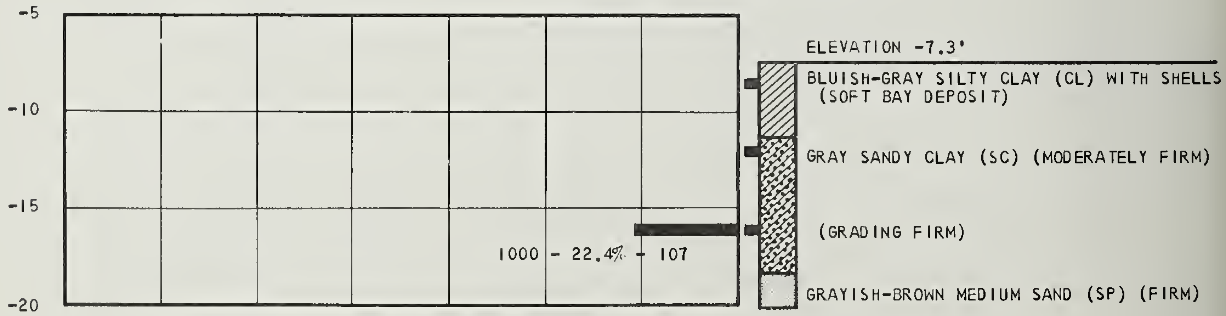
BORING 1
DRILLED 8-13-60



BORING 2
DRILLED 8-13-60



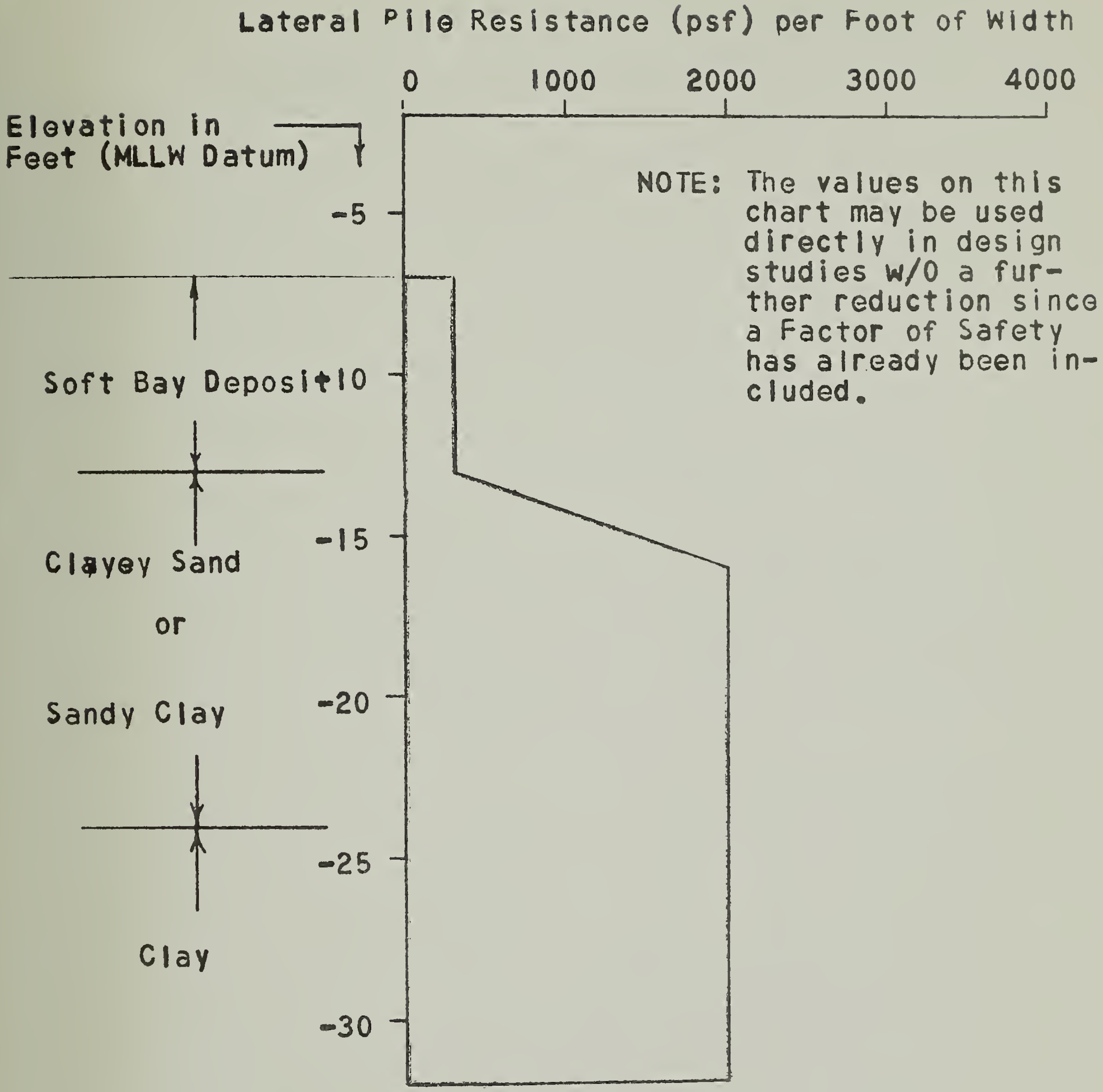
BORING 3
DRILLED 8-13-60



LOG OF BORINGS

NOTES:
BORINGS DRILLED WITH WASH-DRILLING EQUIPMENT.
ELEVATIONS REFER TO M.L.L.W. DATUM.

DAMES & MOORE
SOIL MECHANICS ENGINEERS



NOTE: The values on this chart may be used directly in design studies w/0 a further reduction since a Factor of Safety has already been included.

LATERAL PILE RESISTANCE

LIVINGSTON AND BLAYNEY, City and Regional Planners

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Market Studies: Melvin M. Webber, Special Consultant
Peter Coates

Design: Naphtali H. Knox
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ACKNOWLEDGMENTS

In addition to the City officials listed at the front of this report, the following persons contributed significantly to the study:

Elvin A. Curtis, Administrative Officer, Division of Small Craft Harbors

J. M. Thompson, Supervisor, Data Processing Division, City of Berkeley

Progress Report No. 4

October 3, 1960

BERKELEY WATERFRONT: ALTERNATE SKETCH PLANS

Report to the City of Berkeley

Livingston and Blayney, City and Regional Planners
John Carl Warnecke and Associates, Architects and Planning Consultants
John A. Blume and Associates, Engineers

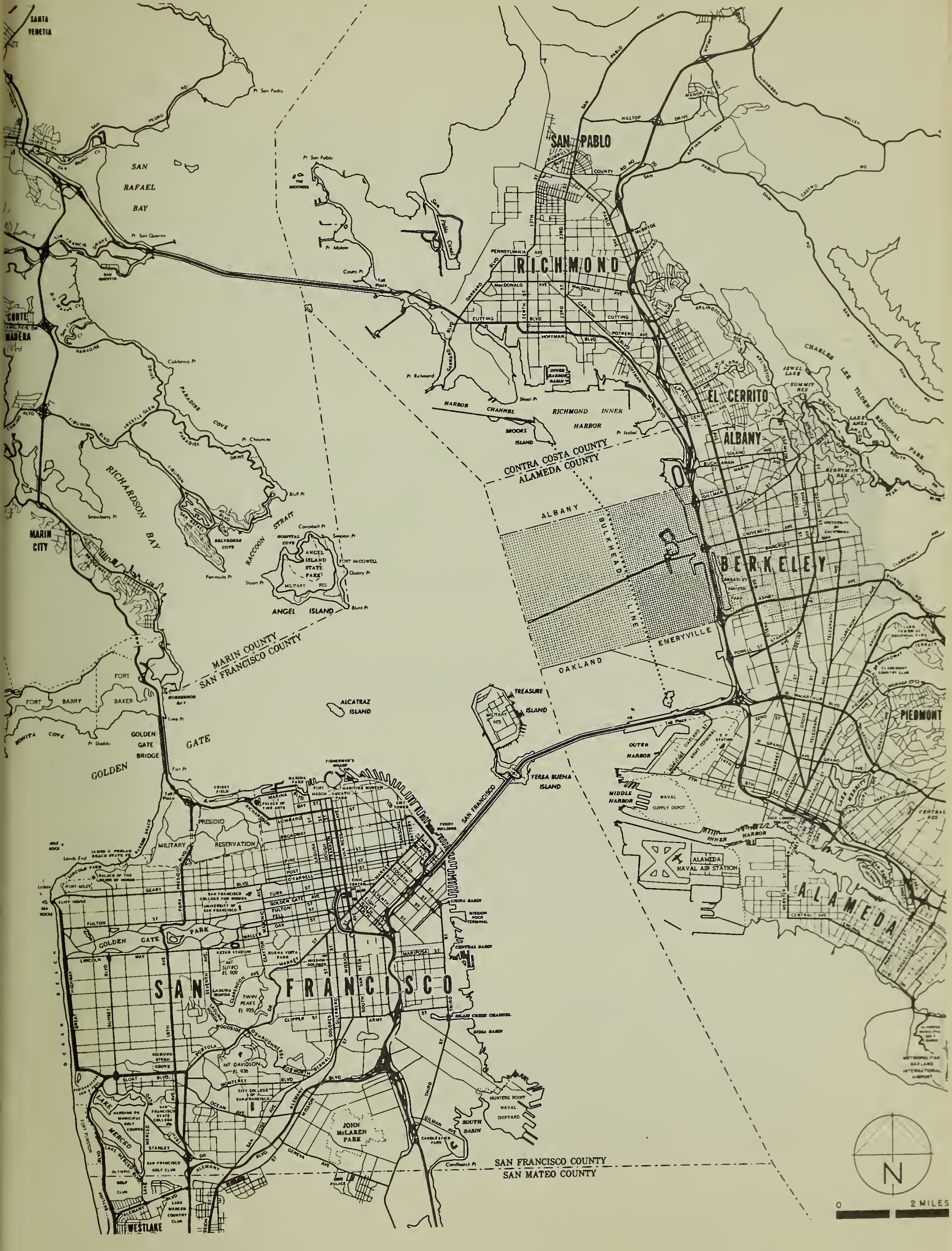
This report describes and illustrates three alternate plans for the development of Berkeley's waterfront. Its purpose is to provide the basis for an amendment to the Berkeley Master Plan. When the amendment setting the general scheme has been adopted by the City Planning Commission and the City Council, the consultants will prepare a detailed development plan showing building sites and improvements, and including engineering costs in relation to the scale and timing of development. This plan will enable the City to proceed with filling the tidelands.

The three alternate plans are intended to illustrate the major land use choices that must be made. Obviously, many workable combinations have not been illustrated. It is not necessary that any one plan be approved as drawn; features of two or three plans could be combined.

Visitors from abroad frequently are shocked at the failure of Bay Area cities to take advantage of their waterfronts. Crowds at the few pleasant and accessible locations (the Marina in San Francisco, Sausalito, Alameda south shore, Berkeley Harbor) are evidence of the desire of people to be near water. Residential areas close to the water command high prices. Berkeley has a magnificent opportunity to develop its waterfront as a place of beauty and distinctive character, while at the same time strengthening the tax base of the City. Probably this development will take twenty years or longer to complete, but it can start immediately.

The Site

Over half of Berkeley is under water. Between the Eastshore Freeway and the City boundary, 3.3 miles west are 4,407 acres granted to the City by the California Legislature, 730 acres owned by the Santa Fe Railway Company, and 51 acres


SANTA VENETIA
SAN RAFAEL BAY
CORTE MADERA
MARIN CITY
RICHARDSON BAY
PARADISE COVE
RACCOON STRAIT
ANGEL ISLAND STATE PARK
ANGEL ISLAND
MARIN COUNTY
SAN FRANCISCO COUNTY
FORT BARRY
FORT BAKER
BONITA COVE
GOLDEN GATE BRIDGE
GOLDEN GATE
ALCATRAZ ISLAND
TREASURE ISLAND
YERBA BUENA ISLAND
PRESIDIO
MILITARY RESERVATION
GOLDEN GATE PARK
MT SUTRO EL 909
TWIN PEAKS EL 925
MT DAVIDSON EL 938
JOHN McLAREN PARK
HUNTERS POINT NAVAL SHIPYARD
SOUTH BASIN
LAKE MERCED
SAN FRANCISCO
WESTLAKE
SAN FRANCISCO COUNTY
SAN MATEO COUNTY
SAN PABLO
RICHMOND
HARBOR CHANNEL
RICHMOND INNER HARBOR
BROOKS ISLAND
CONTRA COSTA COUNTY
ALAMEDA COUNTY
EL CERRITO
ALBANY
BERKELEY
BULKHEAD LINE
EMERYVILLE
OAKLAND
OUTER HARBOR
MIDDLE HARBOR
NAVAL SUPPLY DEPOT
ALAMEDA NAVAL AIR STATION
ALAMEDA
PIEDMONT
JEWEL LAKE
CHARLES LEE TILDEN REGIONAL PARK
N
0
2 MILES

owned by the Pacific Guano Company. Unless relocated by the U.S. Army Corps of Engineers, the bulkhead line establishes a western limit of fill half the distance from the freeway to the City limit. The City property now is used for recreation and for sanitary fill. The eastern 2,000 feet of the old auto ferry pier extending west to the City limit has been improved and maintained as a fishing pier. The municipally owned and operated Berkeley Harbor berths 284 boats. More than 200,000 persons visit the harbor and pier each year. The Berkeley Marina Development Plan, submitted September 15, 1960, makes detailed proposals for expanding the harbor to 604 berths. The City disposes of refuse and garbage by diking an area, pumping it dry, filling with refuse and covering with soil. This process now creates 10 acres of new land each year, although extreme settlement makes the fill unsuitable for building construction for at least 10 years.

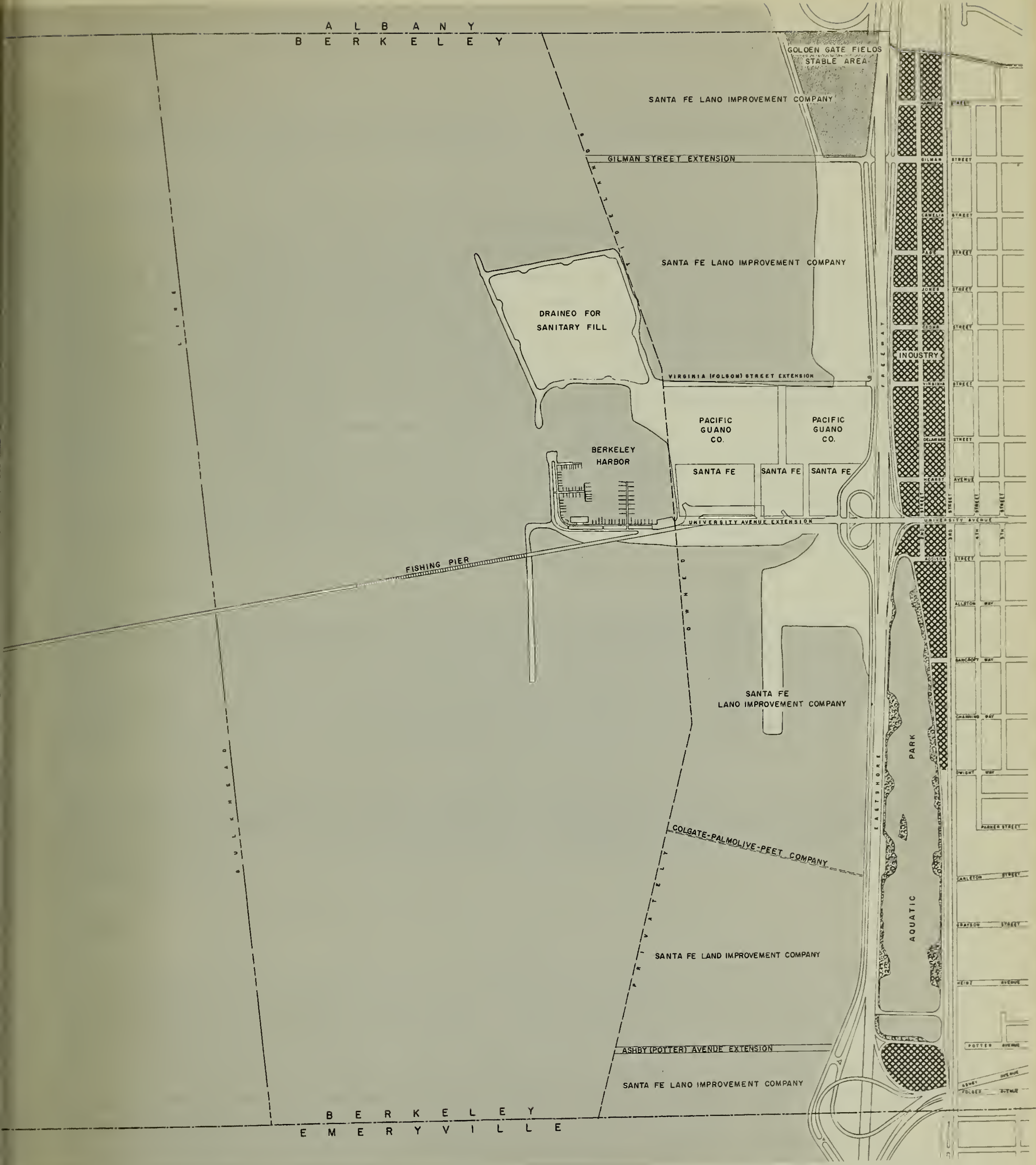
From the freeway, the bay floor slopes uniformly west at about 8 inches per 1,000 feet. The water depth at mean lower low water ranges from 2 to 10 feet, averaging about 7 feet. Of more importance when considering the feasibility of reclamation is the depth of the layer of mud on the bottom. The thicker the mud, the greater the settlement and the higher the cost of fill. An electronic probe survey conducted as part of this study found no unfilled areas east of the bulkhead line with mud deeper than 20 feet. Only a few areas south of the pier have mud depths greater than 14 feet. Thus the cost of reclamation will be similar in all areas east of the bulkhead line.

The Berkeley waterfront is directly in the path of the winds and fogs blowing through the Golden Gate. The average wind from the west or southwest is 13 miles per hour. Frequent strong winds create high waves, making the water unsuitable for small boats much of the time.

Other Plans

At least half a dozen plans for the Berkeley waterfront have been prepared during the last 15 years. The most recent are the Berkeley Master Plan of 1955 which proposed development both east and west of the bulkhead line (500 acres, industry; 750 acres, residence; 450 acres, recreation); and the Tudor Engineering Company plan, prepared for the City in 1956, which proposed development only east of the bulkhead line and south of the pier (500 acres, industry; 390 acres, stadium area; 110 acres, park; 140 acres, marina).

The type and timing of waterfront development in adjoining communities will affect both the character of the Berkeley waterfront and the demand for reclaimed land. Emeryville may be expected to devote most of its tidelands to heavy industry. The Port of Oakland, which controls all of the Oakland territory abutting the Berkeley waterfront, proposes port and industrial facilities extending beyond the bulkhead line to the City boundary. Approximately half of Albany's submerged land east of the bulkhead line is owned by the Santa Fe Railway and must be presumed to be available


ALBANY
BERKELEY
GOLDEN GATE FIELDS STABLE AREA
SANTA FE LAND IMPROVEMENT COMPANY
GILMAN STREET EXTENSION
SANTA FE LAND IMPROVEMENT COMPANY
DRAINED FOR SANITARY FILL
VIRGINIA (FOLSOM) STREET EXTENSION
INDUSTRY
PACIFIC GUANO CO.
PACIFIC GUANO CO.
BERKELEY HARBOR
SANTA FE
SANTA FE
SANTA FE
UNIVERSITY AVENUE EXTENSION
FISHING PIER
FREEWAY
SANTA FE LAND IMPROVEMENT COMPANY
EASTSHORE
PARK
AQUATIC
COLGATE-PALMOLIVE-PEET COMPANY
SANTA FE LAND IMPROVEMENT COMPANY
ASHBY (POTTER) AVENUE EXTENSION
SANTA FE LAND IMPROVEMENT COMPANY
LINE
BULKHEAD
OWNED
PRIVATELY
BERKELEY
EMERYVILLE
N
0
1000'

BERKELEY WATERFRONT

LAND USE AND OWNERSHIP

only for industry. The City is studying plans for recreation and residential development on City-owned tidelands.

Bulkhead Line

Aside from the doubtful aesthetic merits of "filling up the Bay", there are several other reasons for not attempting to relocate the bulkhead line. It is questionable whether the U.S. Corps of Engineers would grant a request to permit fill beyond the line because a reduction in the tidal prism (difference in volume of water in the Bay at mean lower low water and mean higher high water) would change current velocities with possible adverse effect on shoaling patterns. Objections of neighboring communities also could prevent relocation of the line. Significant additional land area would generate enough traffic to require a third major north-south trafficway; and would place the outer dike so far west that it probably could not be built as part of the first stage, thus requiring two armored dikes and increasing the land cost per acre. Finally, the lands underlying the remaining 4.5 square miles of open water in Berkeley will be a source of inexpensive fill material. Reduction of this area would require more importation and consequent higher land costs.

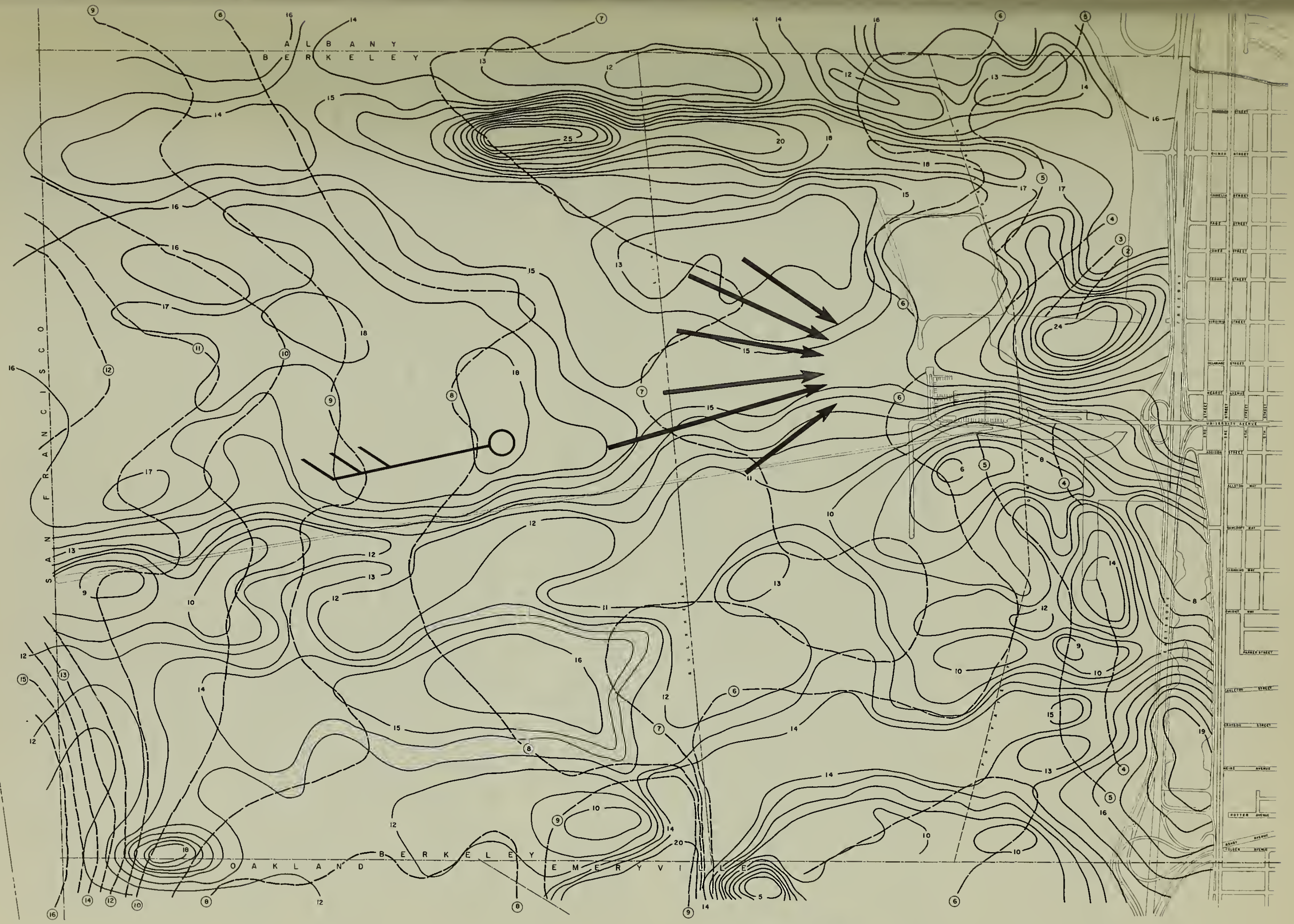
Land Forms

Because all tidelands east of the bulkhead line can be reclaimed at similar cost, open water areas shown on the plans are included for functional and aesthetic reasons, and not to minimize the per acre cost of filled land. The high cost of the armored dike that is necessary to withstand the pounding of waves from the west has made it desirable to simplify land forms and reduce perimeter. Interior lagoons maintained at constant level by tide gates provide extensive water frontage, but require less costly dikes.

On all the plans, open water is left along the Albany and Emeryville boundaries in order to establish the identity of each city, and as a buffer against possible incompatible adjoining development. The open channels along the boundaries also reduce the cost of storm drainage.

Staging

The larger the fill project, the lower the unit costs. Cost estimates in this report assume that at least a major portion of the waterfront will be filled as one project, although work will continue for 4 or 5 years. The expensive armored west dike should be built in its ultimate location, but the entire length need not be built at one time. All plans locate the junior college behind an existing dike, and Plan C also places the convention center where it could be built immediately without high dike costs. These facilities may serve as sparkplugs to stimulate the market for waterfront sites. Unless higher reclamation and sanitary fill costs can be justified, the golf course and the airport must await the accumulation of sufficient sanitary fill area. A nine hole golf course might be built within 6 or 8 years.



BERKELEY WATERFRONT PHYSICAL FEATURES

ELEMENTS OF THE PLANS

The table on the following page compares the three plans quantitatively. Plan A contains the maximum industrial area and no private housing, Plan C provides the maximum residential area and no University facilities, and Plan B balances industry, residence and University facilities.

Industry

The three plans designate all privately owned land and more than a third of the total area for industry. Proximity of industry, the railroad and the freeway diminish the desirability of Aquatic Park for recreation, while enhancing its value as an industrial site. Consequently all plans propose its conversion to industry and replacement of the park by a new one west of the freeways. At the expected average of 15 employees per net acre in rail-served areas and 25 employees per acre in areas not served by railroad, employment at full development will range from 12,000 to 13,600 - about one and a half times Berkeley's present manufacturing job total. Net area ranges from 630 to 700 acres, compared with 284 acres of industrial land now in use in Berkeley with an average of 31 employees per acre. If the University academic and research areas were eliminated from Plans A and B, 180 net acres would be added to the industrial totals.

Industrial Planning Associates, Economic Development Consultants, have studied the market for industrial land and concluded that the acreage designated can be absorbed within ten years after it becomes available. They cite the following factors influencing marketability.

- High land cost will limit prospects to those for which market, labor and prestige considerations dictate the necessity of a close-in site, and those which for special reasons need to be in Berkeley. Among the most likely types: warehousing and distribution; diversified manufacturing, including light metal fabrication, small machinery, plastic molding, extrusion and fabrication, pharmaceuticals, specialty chemicals, optical and scientific goods, electronic equipment, lighting and fixtures, specialty food products, signs and displays, office equipment; research and development facilities; industrial and commercial services, including machine shops, computer centers, testing laboratories, regional insurance offices, bank and utility clerical work centers, engineers' offices, printing and publishing, truck terminals.

  Because of the high value of sites, distribution and service industries are likely to predominate. In similar recently developed districts, the majority of occupants usually are in these two categories. The presence of several light manufacturing operations in the Stanford Industrial Park stems from the origin of these firms as research and development activities, and from their unusual reliance on facilities and talent provided by Stanford University. A similar dependence could emerge in Berkeley between the University of California and firms engaged in research and development. A large amount of private research and product development now is

BERKELEY WATERFRONT SKETCH PLANS: LAND USE SUMMARY

Land Use	Gross Acres[a]					
	Plan A		Plan B		Plan C	
Industry		893		780		811
Rail served	466		466		466	
Santa Fe land	(355[b])		(355[b])		(355[b])	
Pacific Guano land	(30)		(30)		(30)	
Aquatic Park	(81)		(81)		(81)	
Non-rail served	427		314		345	
Santa Fe land	(226)		(226)		(226)	
Pacific Guano land	(18)		(18)		(18)	
City land	(183)		(70)		(101)	
University						
University research or industry		150		150		-
University academic reserve or industry		75		75		-
University athletics		35		35		-
University married student housing		75		75		-
Elementary school		5		5		-
Residence		-		105		260
Elementary school(s)		-		5		12
Junior high school		-		-		8
Junior college		65		65		65
Shopping center		2		5		15
Convention center		15		15		15
Airport-heliport		75		75		20
Parks		127		114		185
Golf course		140		140		140
Marinas		55		89		111
Freeway, thoroughfares and railroad		206		203		187
TOTAL LAND AREA		1,918		1,936		1,829
Open water		106		69		80
Harbor basin		205		211		277
Lagoon		71		84		114
TOTAL WATER AREA east of bulkhead line		382		364		471
TOTAL LAND AND WATER AREA east of bulkhead line		2,300		2,300		2,300

[a] Local street area included.

[b] Includes 29 acres Golden Gate Fields stable area.

being carried on in Berkeley, in widely scattered locations, frequently in small subdivisions of older plants. The existence of such operations has been fostered by available inexpensive space and by ready access to technological skills from local industry and the University. The magnitude of this activity qualifies Berkeley as an incubator city for many types of industries, much as the San Carlos-Palo Alto area has become in the field of electronics. In the case of Berkeley, the chief interest appears to be in the chemical and biological sciences, scientific instruments, plastics, and in the broad new area of the space sciences. Some of these small operations will grow into major employers requiring larger plant facilities, as have Hexcel Products, Misco, and Tinsley Laboratories, and, as in each of these cases, many of the expanding firms will wish to remain in Berkeley.

- Most industries will want parcels of three to five acres.

- The Santa Fe Railway's desire to sell only to rail users, combined with the ever-diminishing proportion of firms requiring rail service, will affect the rate of development of the rail-served area.

- Since 1955, in a half-dozen close-in planned industrial districts in the Bay Area, about 350 acres have been occupied by market-oriented distributing and manufacturing firms. Another 100 to 150 acres have been used for industrial and commercial service operations. Research activities closely related to Stanford University have been directly responsible for the development of industries that have occupied almost half of the 400-acre Stanford Industrial Park during the same five-year period.

- At the present rate of economic development and plant location, the close-in industrial districts now available in the Bay Area will be almost fully occupied by 1965. These properties include the 200-acre South San Francisco Industrial Park developed by Utah Construction Company, about one-half of which still is available; the new 125-acre East Millsdale Industrial Park; the 200-acre Crocker Industrial Park, which now has six tenants occupying a total of 30 acres; the 35 acres of industrial land in the DeVelbiss Estate at Albany; and approximately 300 acres in planned districts in the San Leandro area, about half of which presently are occupied. Only a limited number of individual sites held by companies for expansion or by investors for maximum appreciation are likely to remain unused by 1965. More distant sites are not considered directly competitive.

- The major competitive areas that presently are being planned or developed, and are likely to be on the market between 1965 and 1980, are those of the Southern Pacific Railroad at Brisbane, the Port of Oakland at Oakland International Airport, and the 1,000 acres owned by Santa Fe on the Albany and Emeryville waterfronts. With the completion of the Point Isabel fill project in Richmond, the Albany waterfront is next in the path of Santa Fe's development along the shore. When fill and rail trackage extend to the northern Berkeley city limit, the very desirable Emery-

ville property will be within reach. The unique demand for Emeryville sites, resulting from a very low tax rate, will speed its development. Except in Richmond, no current plans indicate that major new close-in industrial areas will be made available by redevelopment during the next 20 years.

- When sites have been available, Berkeley land prices usually have ranged near the top of the Bay Area market, excepting San Francisco. The average 1950-1955 price for a parcel of one to five acres was about $35,000; the 1955-1958 average about $46,000; and prices since 1958 have averaged about $57,000, with sales ranging from $1.25 to $1.40 per square foot.

  While there is no indication that industrial land prices in the Bay Area or in Berkeley have reached their peak, a somewhat slower rate of rise may be assumed for the years ahead, as extended freeways make outlying sites more feasible for many types of manufacturing and distributing operations. Assuming continued present levels of national and regional economic prosperity, sales prices of sites in an attractively developed industrial district in Berkeley can be expected to range from $1.40 to $1.70 per square foot ($61,000 to $74,000 per acre) by 1970, and from $1.70 to $2.00 per square foot ($74,000 to $87,000 per acre) by 1980.

University Facilities

In accord with a contract requirement, the consultants considered future needs for University of California facilities on the waterfront. Meetings were held with University officials, and the Physical Development Planning Subcommittee of the Committee on Buildings and Campus Development recommended that 450 acres be obtained for University uses. Plans A and B include a maximum of 335 acres of University land.

Research Facilities

Plans A and B designate 150 acres for either University research facilities or private industry. The land is located so that it will be equally suitable for either, allowing the use with the strongest claim at the time the land is developed to prevail. It is impossible to forecast research space needs, but it is safe to say that rapid increase is likely. It is quite possible that University research growth will lead and stimulate development of the waterfront, both by initiating large scale filling and by attracting related private industry.

Academic Reserve

Plans A and B allocate 75 acres for either academic reserve or industry. Since University space needs cannot be accurately foreseen, final determination of the use need not be made now. Because the area adjoins married student housing on Plan A, industry should be limited to the research type.

University Athletics

Track and baseball stadiums, varsity practice fields and parking areas occupy 35 acres on Plans A and B. The central campus location of the Edwards Fields, where these facilities now are located, makes them vulnerable to academic expansion requirements.

University Married Student Housing

Present University housing policy calls for construction of 1, 100 married student housing units, in addition to those on the Gill Tract in Albany, by the time enrollment reaches 27, 500. No undeveloped sites are available in Berkeley. Plans A and B show 75 acres (15 units per gross acre) for housing and 5 acres for an elementary school.

University Facilities Not Included

Several University athletic facilities were considered but not included on any of the alternate plans: a football stadium with parking for 10, 000-15, 000 cars, because it would be too expensive to reproduce Memorial Stadium which is not on a prime academic site and because of the possibility of construction of a public stadium in Oakland; a crew course, because wind and waves make the location unsuitable, except possibly for a short east-west course, because the cost would be high in relation to use, and because of the likely availability of San Pablo Reservoir, which is closer to the campus than the Oakland Estuary and could accommodate a three mile course with no wind or tide problems; and a basketball pavilion, because the large indoor space is needed near the academic core for meetings.

Residence

Climate is a strong negative factor affecting the desirability of the waterfront as a place to live; while the central location, spectacular views, lagoon, marina and golf course appear to be stronger positive factors. Plan A includes no private residential area. Plan B provides for 2, 100 dwelling units (5, 250 persons) at an average density of 20 units per gross acre (including streets). Two elementary schools would be required (0.25 children per dwelling in grades K-6) to serve the private and the University residential areas. Plan C has 5, 200 dwelling units (13, 000 persons) at the same density, and would require 2 elementary schools and a junior high school. Elementary schools adjoin parks, and the junior high school adjoins a 7 acre neighborhood playground. The total neighborhood recreation space provided complies with the standards of the Berkeley Recreation Plan (14 acres in Plan B; 20 acres in Plan C).

As in the case of the University academic and research areas that could alternatively be used for industry, the University married student housing areas on Plans A and B could be used for private residential development. However, if the academic area on Plan A were to be industrial, there would have to be an adequate buffer between it and the residential area.

Variations in density will be worked out when the development plan is prepared. The average of 20 units per gross acre envisions tower apartments, garden apartments, town houses, and possibly a few detached homes. The cost of land reclamation, streets and utilities will average $2,250 per dwelling unit.

Junior College

Superintendent of Schools C.H. Wennerberg estimates that the cost to the Berkeley School District of sending junior college students elsewhere will justify construction of a junior college within 10 years. The waterfront offers the only suitable sites in Berkeley, and consequently a junior college is shown on all plans. Although the State Division of School Planning's standard site area is 100 acres, careful design will permit 65 acres to serve an expected enrollment of 3,250 from Berkeley, Albany and Emeryville when Berkeley's population reaches a holding capacity of 180,000 as proposed by the Master Plan. The proposed University athletic fields might be available for joint use by the junior college.

Shopping Center

Neighborhood shopping centers scaled to the size of resident population are shown on all plans. A shopping center of a size that would draw substantial trade from east of the freeways would conflict with the principle of the Berkeley Master Plan that the central business district remain the dominant shopping area.

Convention Center

Interviews with developers of major motels and convention facilities reveal enthusiasm for the waterfront as a site for motor hotels, a convention center and commercial recreation facilities such as bowling. Claremont Hotel expansion plans indicate the strength of the market. All plans allocate space for a convention center. Plan C provides a site adjoining the Marina that could be developed immediately. Plan B has a site with spectacular Bay views and park surroundings; it could be developed as soon as the westerly dike is built. Plan A situates the convention center adjoining the golf course and harbor basin on the sanitary fill; later stage construction would be necessary.

Airport-heliport

Plans A and B provide a secondary airport-heliport with a 2,800 foot runway, while Plan C has only a heliport. A secondary airport is used by non-commercial low horsepower planes, and only non-instrument landings are permitted. In order to receive matching federal funds for construction, an airport must be part of the National Airport Plan. Berkeley was deleted from the plan in 1957, but can petition for inclusion at any time. The Federal Aviation Agency District Airport Engineer states that Berkeley "is in a high density air traffic area, and a preliminary study has indicated that an airport even limited to visual flight rule operations would result in airspace problems".

One thousand foot clear zones are provided at the ends of the runway as recommended by FAA. The approach area extending 10,000 feet from the runway would reach as far east as Curtis Street, but at this location planes would be at least 450 feet above the ground and noise would cause little nuisance. The FAA recommends that schools not be within one-half mile of the approach zone for light aircraft, although few, if any, secondary airports in the Bay Area conform with the standard. Jefferson, Franklin, Franklin Primary, and Burbank schools are within this area. In order to keep the approach zone a half mile from all schools, it would be necessary to move the airport one mile west. This would require relocation of the bulkhead line, and would result in much higher airport construction cost.

As shown on Plans A and B, the airport would be located on the sanitary fill area, possibly on select fill.

A helicopter taxi service now landing occasionally at Golden Gate Fields race track has expressed interest in establishing scheduled service to Berkeley. A heliport would not involve approaches over residential areas.

Parks

The plans provide 114 to 185 acres of Bay-front and lagoon-side parks for the enjoyment of Berkeleyans. Like Venice's Lido, the west shore park south of the harbor entrance would have the character of an island lying between the Bay and the lagoon.

Golf Course

All plans show an 18 hole golf course to be located on sanitary fill. Using the most efficient sanitary fill method, about 15 years would be required to fill the site. Total cost of golf course development would be $1,750,000, of which $1,150,000 would be its share of dike and storm drainage costs. Income would be adequate to pay for construction and maintenance of the course, but not for the cost of preparing the site. The present shortage of golf courses in the East Bay, combined with the demonstrated preference of mid-week golfers for level courses, indicate that a waterfront golf course would be heavily used.

Marinas

In addition to the 604 berths proposed at the present harbor by the Berkeley Marina Development Plan, sketch plans B and C provide for 400 and 900 new boat berths, respectively. The new harbors are close to open water, and are oriented so that sailboats can take advantage of prevailing winds. The 205-277 acre entry basin shown on all plans will provide a protected sailing area that will attract more small boats to Berkeley.

Lagoons

All plans have constant level interior lagoons serving several purposes: to replace Aquatic Park; to provide space for small boat sailing (no power boats); to create protected beaches; to separate residential areas from industrial areas; to maintain open areas that permit views of Berkeley; to place as many residential and recreation areas as possible close to water and thus create an amenity that balances comparatively high development costs.

Fishing Pier

All plans maintain the fishing pier by moving the new concrete decking to the undecked portion west of the limit of fill. This was the City's intention at the time the pier was rehabilitated.

Trafficways

When the waterfront is fully developed there will be 56-58,000 vehicle trips per day entering and leaving the area. About 30 per cent of these trips will be between Berkeley and the waterfront; the other 70 per cent will be en route to or from more distant points via the freeways. The Shoreline Freeway west of the Eastshore Freeway is part of the California Freeway System, and probably will be built within the next 10 to 15 years as an 8 lane route (6 lanes recommended by Wilbur Smith and Associates, 1959). The Ashby Freeway is expected to be completed sooner to relieve overcrowded Ashby Avenue.

University Avenue now carries 25 per cent more traffic than it can handle without congestion. Gilman Street, the other Berkeley connection, is nearing capacity. Traffic projections by Wilbur Smith and Associates foresee a 48 per cent increase in University Avenue and Gilman Street traffic by 1980 without any waterfront development. Since the waterfront will generate nearly as many trips as all of Berkeley west of Sacramento Street does today, it is clear that new east-west street capacity will be needed, in addition to extension of University and Gilman to Shoreline Freeway interchanges. All the sketch plans extend Cedar Street across the two freeways as a 4 lane thoroughfare. No freeway interchanges are proposed because the short distance between University and Gilman would not permit adequate weaving distances between interchanges. Dwight Way is extended on Plans A and B as a 4 lane thoroughfare to interchanges with both freeways. Plan C does not include Dwight Way because residential areas will not have as heavy peak hour traffic.

Continuous freeway frontage roads will be necessary, but the plans do not show this detail. A scenic shoreline drive is a feature of all plans.

Railroad

All plans assume that the Santa Fe Railway main line tracks will be relocated between the two freeways, in accord with the long-range plans of the Company.

COSTS

Typical costs per net acre including streets and utilities:

	Per net acre
Aquatic Park (80 per cent net)	$52, 700
Other industrial areas (80 per cent net)	61, 500
Residential areas, schools, commercial areas (75 per cent net)	60, 000
Parks (90 per cent net)	42, 500
Golf course, airport (90 per cent net)	15, 600
Basin	7, 800
Lagoons	56, 000

Factors and assumptions used as bases of cost calculations:

- Hydraulic clay and sand fill from City tidelands will be covered with five feet of imported sand in industrial areas and three feet of sand elsewhere. If detailed investigation reveals substantial sand deposits in the city, cost will be reduced as much as 15 per cent. Land elevation after settlement will be +10 feet (MLLW).

- Five years must be allowed for settlement of the fill before building construction. Interest is included on all costs incurred before the settlement period. Total cost would be higher for fill methods that permit immediate construction.

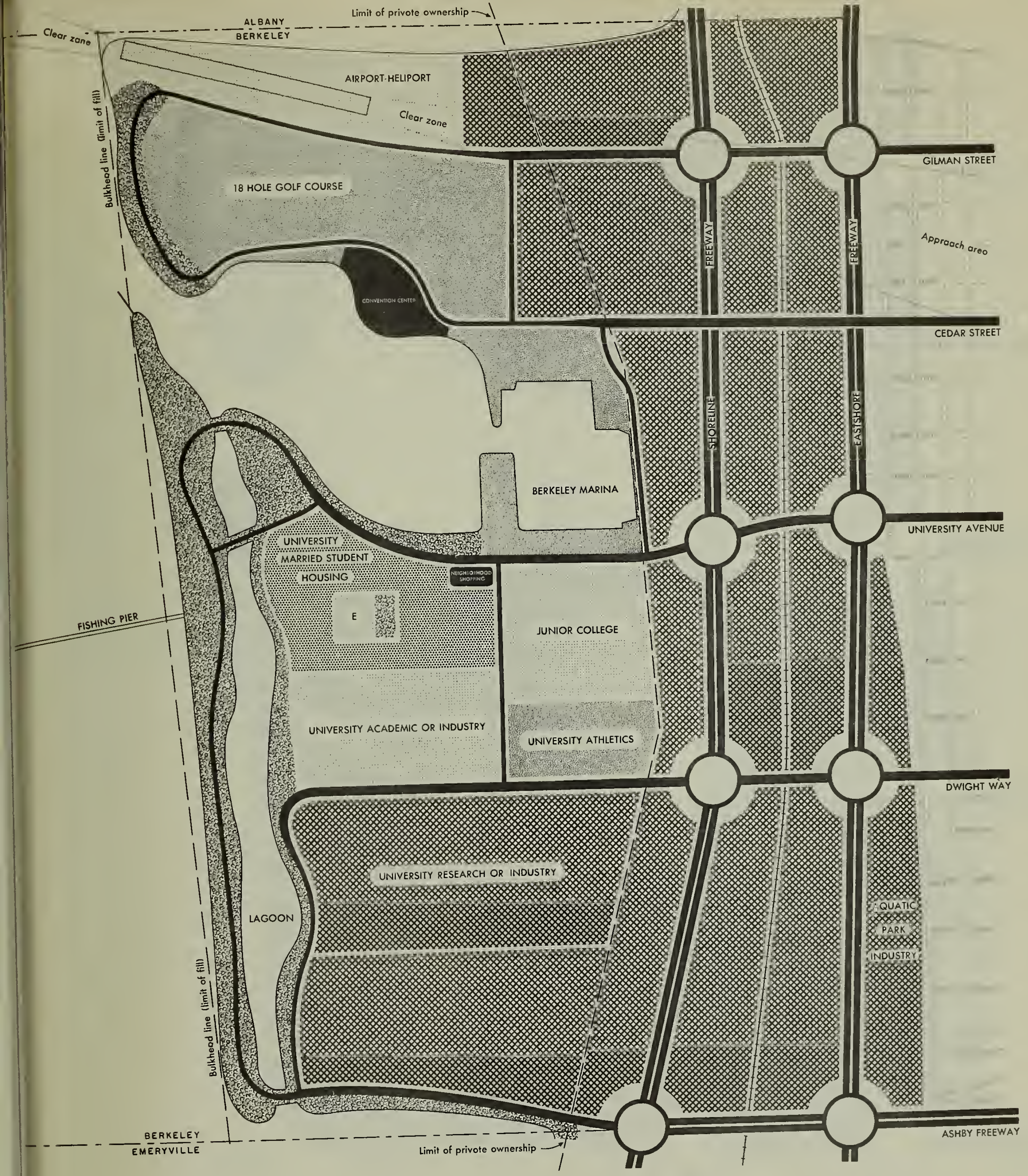
- The most economical method of extending existing storm drainage outfalls is by underground conduit with pumps rather than by tidal canals. The entire cost is charged to waterfront development, although part could be assigned to necessary improvement of the existing system.

- The comparatively high cost of lagoons results from the need for a perimeter dike to retain hydraulic fill during construction.

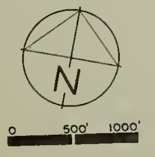
BERKELEY WATERFRONT SKETCH PLANS: COST

(Dikes, fill, drainage, streets, utilities.)

	Plan A	Plan B	Plan C
Perimeter dikes	$10,605,000	$10,215,000	$11,240,000
Fill	33,743,000	33,388,000	31,346,000
Improvements (streets, utilities)	16,745,000	16,650,000	15,455,000
Storm drainage	2,137,000	2,137,000	2,137,000
Lagoons: Dikes	2,440,000	3,400,000	4,130,000
Drainage	80,000	105,000	194,000
Fishing pier rehabilitation	50,000	50,000	50,000
Less cost of dikes necessary for sanitary fill	- 920,000	- 860,000	- 640,000
SUBTOTAL	$64,880,000	$65,085,000	$63,912,000
Contingency and engineering: 20 per cent	12,976,000	13,017,000	12,782,000
	$77,856,000	$78,102,000	$76,694,000
Interest: 5 years at 5 per cent for costs incurred before settlement period	9,713,000	9,814,000	9,900,000
TOTAL	$87,569,000	$87,916,000	$86,594,000



BERKELEY WATERFRONT
SKETCH PLAN
alternate A



▨ RESIDENTIAL

■ COMMERCIAL

▨ INDUSTRIAL

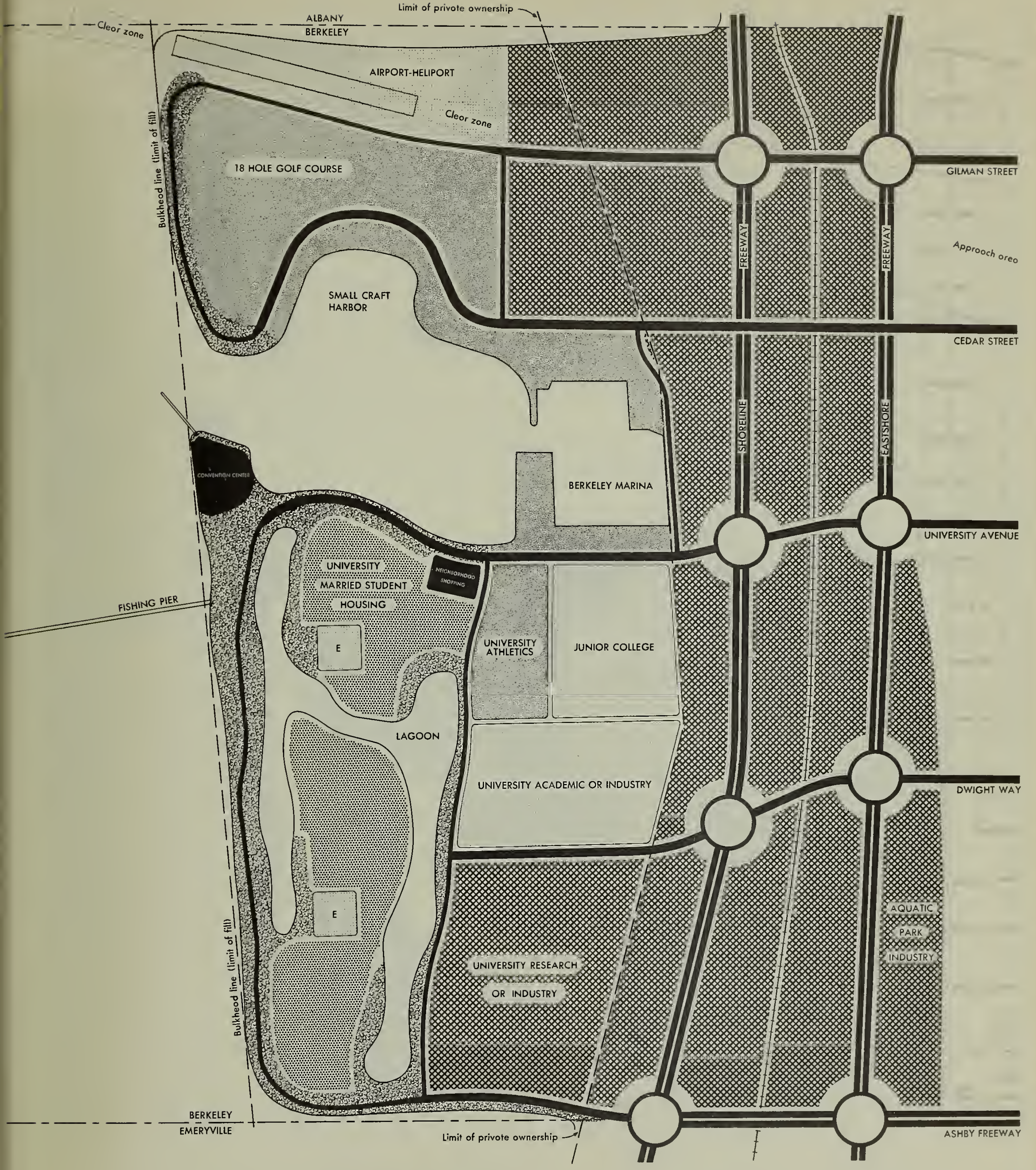
▨ RECREATION

☐ SCHOOLS
E–Elementary

— TWO LANE THOROUGHFARE

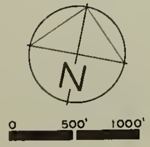
▬ FOUR LANE THOROUGHFARE

○ FREEWAY AND INTERCHANGE

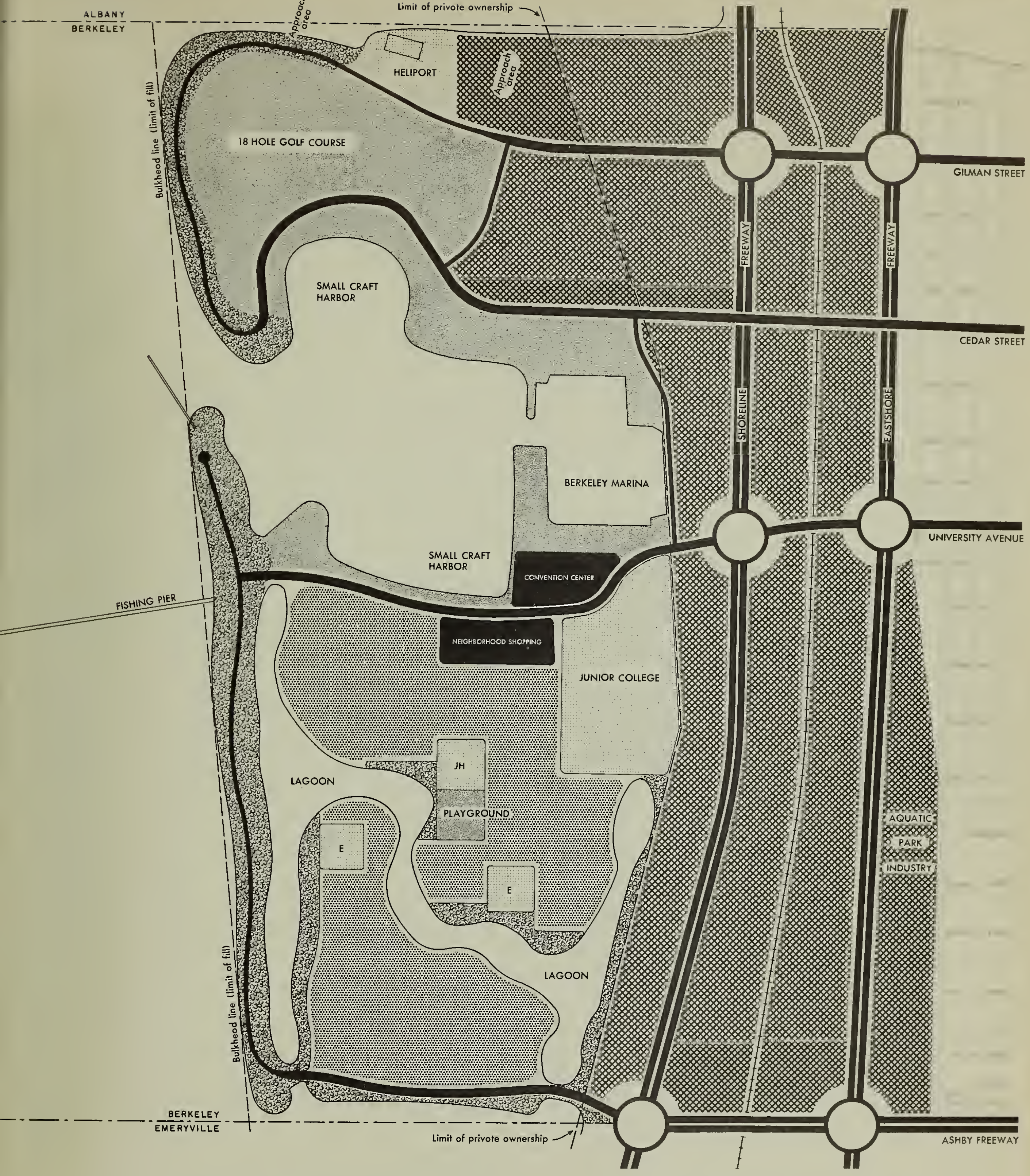


BERKELEY WATERFRONT
SKETCH PLAN

alternate **B**



- ▨ RESIDENTIAL
- ■ COMMERCIAL
- ▩ INDUSTRIAL
- ▧ RECREATION
- ☐ SCHOOLS E–Elementory
- — TWO LANE THOROUGHFARE
- ▬ FOUR LANE THOROUGHFARE
- ○ FREEWAY AND INTERCHANGE



BERKELEY WATERFRONT
SKETCH PLAN

alternate **C**